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CIO

THE MAGAZINE FOR INFORMATION EXECUTIVES

COVER STORY

Fast Company

How Gaining Speed Can Help Boost Market Share

ALSO INSIDE

Health-Care CIOs Brace For Change

Ross Operating Valve Co.'s
Henry F. Duignan

AN INTERNATIONAL DATA GROUP PUBLICATION

Putting Technology

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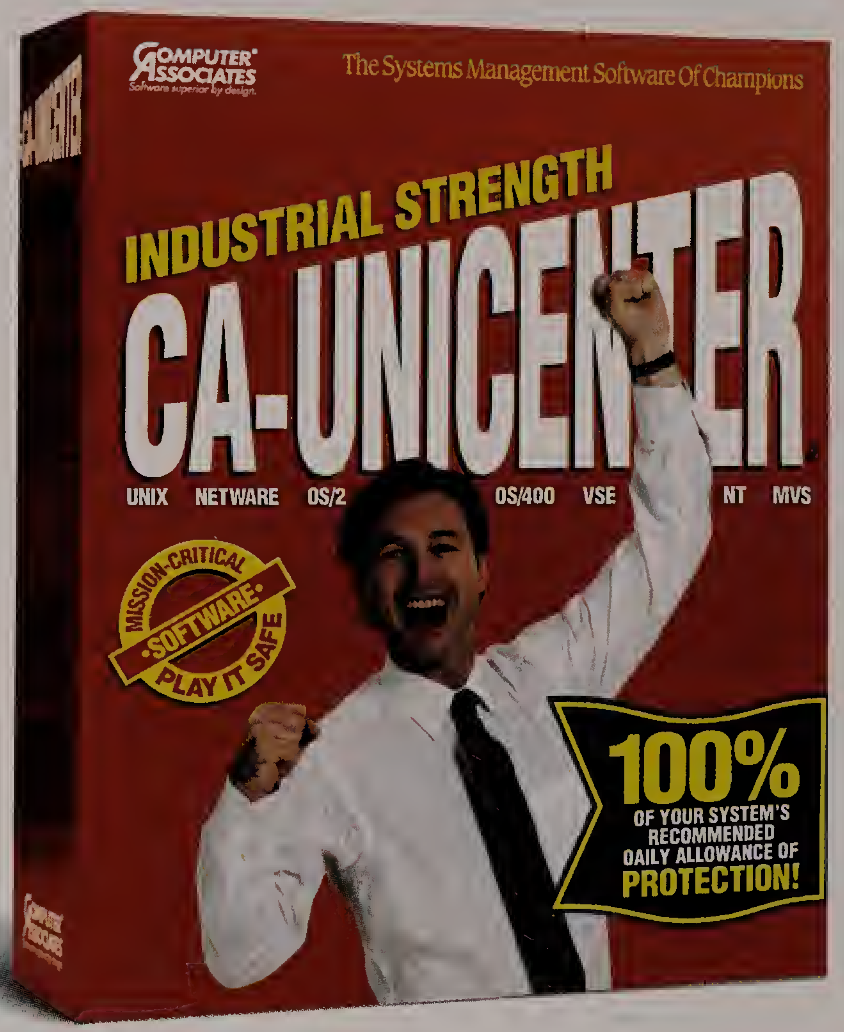
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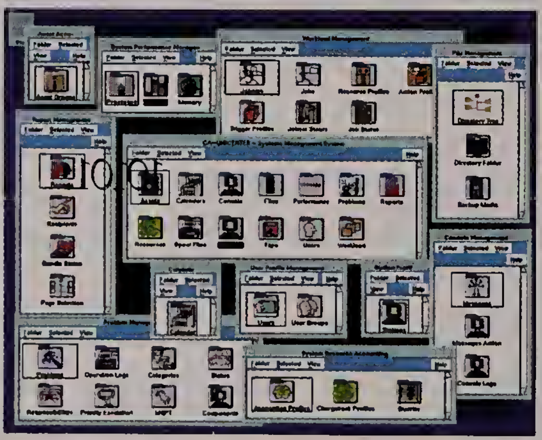

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CIO

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COVER STORY

COMPETITIVE STRATEGIES **50**

Haste Makes...Money

Companies have always raced to get to market first. But today, speed is a competitive weapon that requires being nimble as well as quick; used wisely, it can turn a company around.

By Anne Stuart

On the fast track **50**
Cover photo by Steven Bensen

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AWARDS
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Uncertain Diagnosis

Industries in flux place exceptional burdens on IT organizations, which must meet goals that are not clearly defined and needs that may change daily. In the first in a series of articles on coping with change, *CIO* looks at health care.

By Richard Pastore

MULTIMEDIA **58**

Multimedia Comes of Age

A host of business applications are being infused with new vitality and depth by what has until recently been considered a somewhat frivolous technology set. Multimedia is not just for entertainment anymore.

By Peter Cassidy

CIO NETWORKING **66**

For Members Only

In The Research Board, CIOs of large corporations have a forum for discussion of serious issues, a source of information on technologies and trends, and a place to network with the rest of the information elite.

By David H. Freedman

The new medicine **38**

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INSIGHTS: PARADOX LOST?

After a decade of worry and debate, new evidence indicates that computers may finally be paying off.

By Erik Brynjolfsson

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OUTLOOK: THE DISTRIBUTED DILEMMA

An annual survey of CIOs by Deloitte & Touche turns up plenty of nettlesome problems—and a shortage of ideal solutions. As the stakes and expectations soar, so do the manifest difficulties of being a CIO.

By Jeff Plewa

Re-visioning IT **72**

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NOTEBOOK: KEEP THE CHANGE

Attendees at CIO's most recent conference received a strong message: Their companies' survival into the 21st century will depend on their ability to change both what they do and the way in which they do it.

By Jason S. Casey

FACSIMILE 80

WORKING SMART: FAX ON THE TRACKS

With enterprisewide faxing, Southern Pacific's internal and external communications are more powerful than a locomotive.

By Katherine Auer

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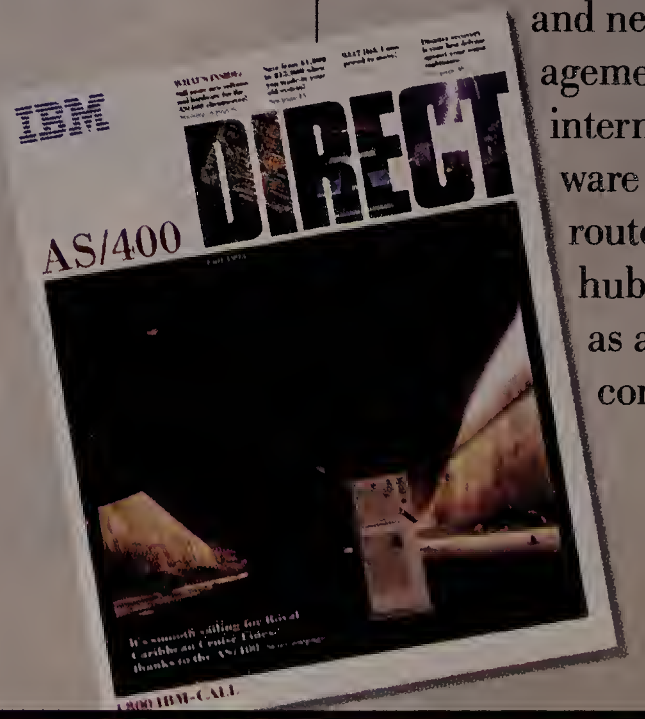

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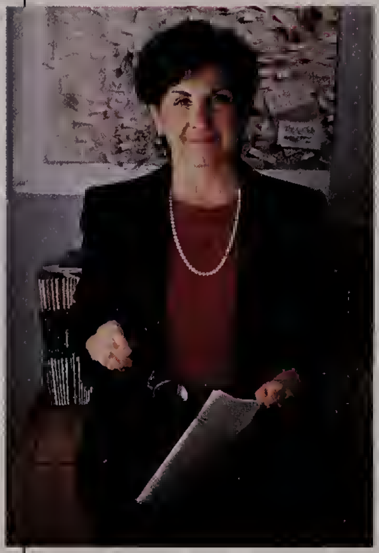
LETTER FROM THE EDITOR



Information executives may talk a good game about client/server technologies and new programming tools, but what all this chat boils down to is change management. And nobody really loves change, except perhaps consultants and gurus who get paid top dollar to tell everyone how we all have to adapt.

In his keynote speech at a recent CIO Perspectives conference in Orlando, Fla., management guru Tom Peters insisted that companies have to become smaller in order to compete creatively. Now is the time for out-of-the-box thinking, he says; hire oddballs—people who ostensibly do things differently—to contribute new breath to moribund organizations.

Along those lines, some of the editors at *Harvard Business Review* recently left that august journal to form a new magazine called *Fast Company*, boasting a tag line "The Magazine for Change Management." The publication is slick and upbeat, heralding the new management era.

So what are CIOs doing about creating change? Plenty. In this month's cover story, Senior Writer Anne Stuart points to companies that have instilled change into the culture of their organizations. For example, Ross Operating Valve Co. has become a flat, nonhierarchical company (please see "Haste Makes...Money," beginning on Page 50). Speed in the marketplace requires nimbleness and flexibility in adapting to new competitive conditions. Companies have to become more entrepreneurial, a tenet that Peters wholeheartedly endorses.

In the first article in a new series spotlighting how change is redefining certain industries, Senior Writer Richard Pastore examines health care (please see "Uncertain Diagnosis" on Page 38). Today, leaders in the health-care delivery system are looking for ways to pool strengths and provide services that eliminate duplication. Interfacility integration tops the list of hot topics, according to a recent survey of more than 1,000 health-care providers.

Linkages with customers and suppliers and amongst employees at all levels are the keys to the ability to adapt to the new business reality. Information management plays a critical role in the ability of organizations to effect change. Although CIOs may not lead the change brigade, they must play a leadership role in helping to position their enterprises for change.

Marcia Blumenthal

PHOTO BY WEBB CHAPPELL

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Demonstrating the bottom-line value of IT is a difficult challenge for many IS executives. And in these cost-conscious times, if a CIO is unable to link technology investments to business value and profit, many purchases will not be approved.

Measuring return on investment (ROI) has become the most critical function of the CIO. This prompted our executive programs division to create the annual ROI•T Executive Retreat—two days of workshops, discussions and case studies designed to provide insight on the correlation between technology investment and profit. (See related story following Page 72.)

James I. Cash Jr., chairman of the M.B.A. program at Harvard Business School, took the helm as ROI•T facilitator at our latest retreat, held Jan. 23-25 in Phoenix. Retreat participants found informative Cash's insights, as well as thought-provoking discussions on measuring IT's return, knowledge-based organizations and the future role of CIOs. In addition, all participants walked away with a better understanding of ROI measurement based on a real-life case study.

One gala evening, retreat participants attended the 1993 ESPRIT (Excellence in Strategic Partnering for Return from Information Technology) Awards ceremony. Honorees were rewarded for outstanding, measurable business success that derives from productive alliances between IS and business leadership. If you would like to be considered for a 1994 ESPRIT Award, please turn to the ESPRIT Awards application following Page 32. The deadline for entry is May 15.

P.S. Registration for the October 1994 CIO Perspectives conference is already underway. Jim Wetherbe will act as "master of ceremonies" as we explore "IT Economics: Business Value & Profit Maximization." The conference will take place Oct. 23-26 at La Paloma in Tucson, Ariz. Please call our toll-free conference hot line at 800 366-0246.

Coming In CIO

Patents Pending

Software vendors have thrown a lot of angry criticism in the direction of the U.S. Patent and Trademark Office for failing to protect their investments. Despite all the ruckus from vendors, however, little attention has been paid to how patents affect the companies for which IS is a critical operational tool. But make no mistake: If your company buys, develops or uses software, the patent system can touch you in significant ways.

Giving Consumers What They Want

There's no such thing as exact science when it comes to figuring out what consumers want, but a department within AT&T Bell Labs is doing its best to eliminate the guesswork. To test product ideas, the department sets up simulated environments that allow consumers to try out prototypes in settings designed to mimic real life. Armed with this and other market-research data, the staff aims to reduce the uncertainty in rolling out new products.

A Virtual Company

In its global expansion, Trafalgar House decided that to outdo the competition, it had to turn its structural liabilities into assets. By linking all of its geographically dispersed locations together with IT, it gave the sites the ability to draw on the expertise of employees around the world. *CIO* looks at how the world's third-largest engineering and construction organization made the whole of its corporation greater than the sum of its parts.

The Union Pacific 7002 locomotive was built to pull heavy passenger trains over the Rocky Mountains, with massive 6-foot wheels driven by 4,000 horsepower. The 7002 ended its spectacular 32-year career as a rescue engine for stalled locomotives.

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The winners of this year's Awards for Achievement in Managing Information Technology are a diverse group that includes the father of France's Minitel system, a decorated Air Force general and a state employee intent on going after deadbeat dads. The awards, cosponsored by American Management Systems and the Graduate School of Industrial Administration of Carnegie Mellon University, recognize and honor executives and professionals who have made outstanding contributions to their organizations—and often to their industries—through the effective use of IT.

Nominees were judged on their vision, originality, leadership and ability to manage resources, as well as on their achievements' impact on their organizations and on the IS profession as a whole. The four gold and three silver medal winners were selected from among several hundred nominations.

This year's gold winners:

JEAN-PAUL MAURY, director of telecommunications for Southern Paris, France Telecom, Paris

The information superhighway has been a hot topic in the United States since 1992; but in France it's old news, thanks in part to Jean-Paul Maury, the father of the Minitel. Back in 1979, only businesses could access interactive data: France Telecom wanted to make that information available to all citizens. Maury's solution: an online directory of telephone numbers and other information that customers could access through inexpensive videotext terminals in their homes. This approach was also a welcome alternative to the expensive and inefficient process of publishing hard-copy phone directories.

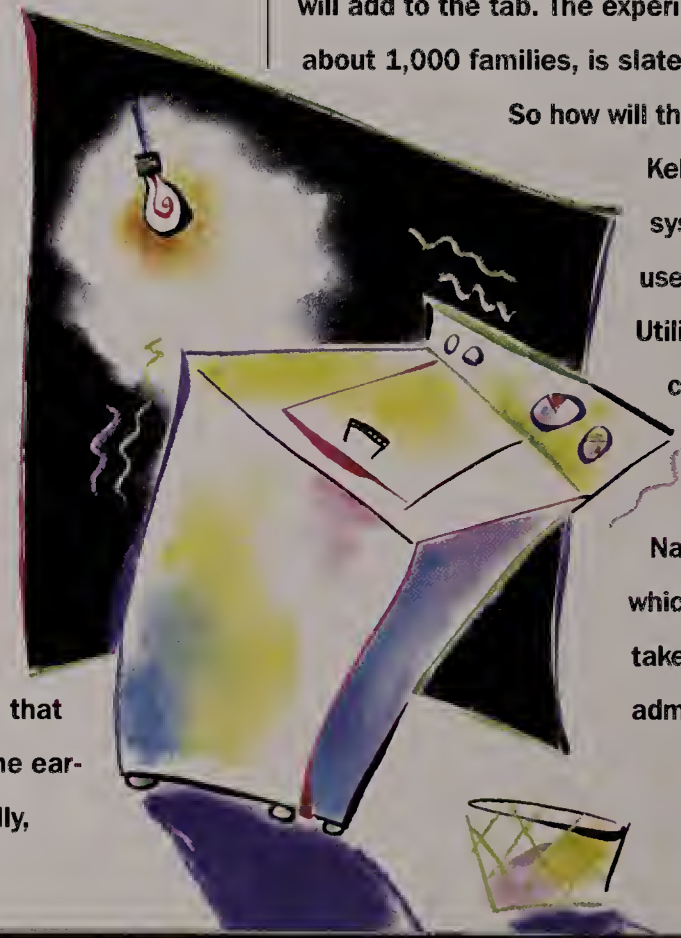
"End users quickly discovered that this electronic phone book provided easy-to-use online services that did not exist anywhere," says Maury. "For example, they could search for someone anywhere in the country without knowing his or her address."

To spur acceptance of the

BUT IT WON'T PUT YOUR CLOTHES IN THE DRYER

Right now it's just a modest experiment to try to manage electricity use, but the way New Orleans-based Enpergy Corp. sees it, this test might just ramp up onto the information highway.

The utility holding company's goal is to reduce electricity usage at peak-load hours—traditionally in the early evening. About 50 test families in Chenal Valley, Ark., a Little Rock subdivision, have connected their electric service to a computer linked to a fiber-optic backbone. The system shifts energy consumption from peak to off-peak hours by, for instance, turning on the washing machine at 2 a.m. instead of 5 p.m. If electric utilities decide to implement a rate system similar to that used by long-distance telephone carriers, that wee-hour wash will end up costing less than the early-evening spin cycle, according to Charles Kelly, Enpergy vice president of corporate communications and public relations.



The home system also gives real-time readings of monthly charges and can tell users how much that next dishwasher load will add to the tab. The experiment, which will eventually include about 1,000 families, is slated to run about a year.

So how will this lead to the information highway? Kelly says that the load-management system requires fiber optics but only uses 5 to 7 percent of its capacity. Utilities are hoping that all the excess capacity from that strung-up cable could be used profitably, perhaps through a leasing scheme. Naturally, long-distance carriers, with which utilities share millions of poles, take a dim view of the whole idea, Kelly admits. "But we still think electric utilities ought to have a chance to move into this area." ■

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system, France Telecom distributed the terminals free to customers and worked with service providers to offer a wide range of applications, including news articles, interactive banking and games. The Minitel currently offers 23,000 different services. Customers can reserve theater tickets, pay utility bills, shop and even vote.

Today, there are more than 6.5 million Minitels in use throughout the country. The system, which handles more than 1 billion calls per year, has positioned France Telecom as a global leader in the introduction of interactive services and multimedia. And it has helped France develop and maintain the largest open, value-added network in the world.

LT. GEN. THOMAS G. McINERNEY, commander, U.S. Air Force Alaskan Air Command, Elmendorf Air Force Base (near Anchorage)

Lt. Gen. Thomas McInerney knew more about flying combat missions than he did about technology when he took over the Air Force's Alaskan Air Command in 1988, but he immediately perceived the need to improve information gathering for air, ground and sea operations. Real-time information—much of it crucial to tracking Soviet air activities and directing search-and-rescue missions—was available only in command centers. Elsewhere across the state, information was faxed, phoned or sent by messenger, resulting in hours-long delays.

McInerney lacked a technology background, but that didn't stop him from developing the Command Tactical Information System (CTIS), which integrates diverse sources of information and delivers crucial data to pilots, planners and commanders. CTIS, which employs a Macintosh user interface, is easily transportable into the field and automatically updates user workstations as new information arises. In combat, CTIS gives both commanders and fighters "a situational awareness of the battlefield," says McInerney.

CTIS is now being converted into an open-systems design called Battlefield Situation Display, a cornerstone of the Air Force's new command and control system. And McInerney, now based at the Pentagon, is involved with the Department of Defense portion of the administration's "reinventing government" initiative.

"Perhaps the most important payoff was that we insisted people consistently use the system—an application of the 'train the way you fight' philosophy," says McInerney. That way "valuable time wouldn't be used to get people trained when we were faced with real-world situations."

STUDENT, HEAL THYSELF

In an effort to cut costs and crowds at its student health center, Lehigh University in Bethlehem, Pa., offers students with minor medical problems the opportunity to treat themselves. Using a computer-based health-assessment program, students can evaluate their symptoms and find out what over-the-counter medicines offer relief; if their symptoms sound severe enough, the program directs them to see a nurse.

The program runs on terminals set up in a self-treatment room in the college's health-care center. When it was implemented three years ago, separate stations were established for colds, headaches, gastrointestinal ailments and rashes; additional stations have since been added for menstrual cramps, minor wounds and safe sex. In addition to quickly dispensing relief, the program aims to help students recognize and prevent minor ailments.

Last year, students visited the self-treatment room more than 2,700 times—about 15 percent of all student visits to the center, according to Marie Cristy, the center's health educator. And self-treatment costs the center only about $1 per student visit, considerably less than a visit with a nurse or a physician. "It's more convenient for the students, and it frees us up to spend more time with the students who most need us," Cristy says.

Lehigh University is interested in selling its program to other institutions. The cost is $300. For information call 215 758-3870. ■

ILLUSTRATION BY MARY ANNE LLOYD

ROBERT M. MELIA, director of strategic planning, Massachusetts Department of Revenue, Boston

Having worked earlier in his career in a mid-level management role at the Massachusetts Department of Revenue's Child Support division, Robert Melia knew well the difficulty of collecting overdue child support from delinquent parents. When he returned to the department several years later as director of strategic planning, he found himself in a position to do something about it. In 1991, Melia launched an effort to improve the process; at the time, the state was collecting only 59 percent of the funds owed by

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in-state parents.

Like most agencies, the department depended upon overloaded caseworkers to handle collections, Melia says. But because of budgetary pressures, it could no longer afford to add caseworkers to increase collections, which was the traditional approach. Instead, Melia redesigned the process to eliminate the need for human intervention. Using the department's existing mainframe-based technology and data the government already possessed, Melia and his team enabled the department to locate the income sources and assets of delinquent parents and seize funds automatically. The team also passed regulations making it possible to follow the parents when they change jobs.

In-state collections soon rose to 80 percent. "We're the only state that has been able to increase collections without increasing staffing," Melia says.

Caseworkers now can also devote more time to tasks that require human judgment, Melia adds, such as establishing paternity in the cases of unwed parents. The result: More children can get the support they need.

KUDOS

WILLIAM R. HOWELL, chairman and CEO of J.C. Penney Co. Inc., is the recipient of this year's Gartner Group Excellence in Technology Award for executive leadership in information technology.

The award recognizes Howell for "successfully managing and deploying information technology to dramatically improve the business," says Manny Fernandez, president and CEO of the Gartner Group. Under Howell's leadership, IT has been applied to achieve a 200-base-point improvement in selling and a reduction in general and administrative expenses.

Penney has invested $200 million in IT for its stores in order to achieve major improvements in merchandise management. Last year, the value of automatically replenished merchandise exceeded $5 million.

The company has also made great strides in electronic data interchange. By the end of last year, 130 Penney buyers and more than 3,400 suppliers communicated via EDI; the technology covers more than 96 percent of purchase orders and 84 percent of invoices. ▬

JAN L. SCITES, president of Connecticut Mutual Customer Services, Connecticut Mutual Life Insurance, Hartford
In 1990, labor-intensive processes and fragmented technology were characteristic of many insurers, and Connecticut Mutual was no exception. Jan Scites saw that using technology to automate current processes would not be enough to help. Instead, Scites, then senior vice president of individual life insurance, convinced the company to reengineer the entire operations in her area.

Scites eliminated many processes and streamlined those that remained. She integrated the firm's mainframe- and paper-based systems by implementing imaging technology. Scites also developed a client/server architecture for eventual transition away from the mainframes and added tools such as bar coding and expert systems to associates' PCs. Simplified access to more-timely information empowered employees and improved customer service. "Our goal is to become the dominant provider of financial services to business owners," says Scites. "And a key to this is our ability to provide world-class service to our customers."

The $6.5 million investment was paid back in 18 months rather than the expected 24, and Connecticut Mutual is saving $4 million annually. Productivity is up by an average of 35 percent, and response time to telephone inquiries has gone from hours or days to seconds. Not surprisingly, the company has asked Scites to help replicate the reengineering effort across all business areas.

Three individuals received silver awards:

PHILIP M. TURNER, dean of the school of library and information studies at the University of Alabama System, created an interactive telecommunications system in 1991 to electronically link the school's three public research universities. Using fiber-optic telephone lines, video cameras and sound-activated microphones, Turner enabled classrooms on all three campuses to share courses and information. The compressed video network, which was implemented in four months and came in well under budget, provides a cost-effective means to maximize educational resources statewide.

JAMES A. EUCHNER, vice president at NYNEX Science & Technology, created the S&T Expert Systems Lab in 1986 as part of the company's efforts to identify pragmatic solutions to business problems. Euchner was instrumental in developing and implementing four expert systems, most notably Arachne, which provides interoffice network planning. Launched in 1991, Arachne allows NYNEX's planning engineers to review and plan central-office connections in as little as three weeks, compared with six months before the system.

FRANK J. ERBRICK, senior vice president of information services for United Parcel Service (UPS), headed a team that designed and launched a real-time pack-

ILLUSTRATION BY MARY ANNE LLOYD

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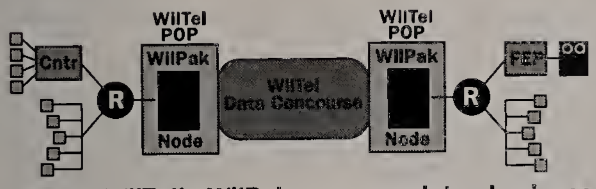

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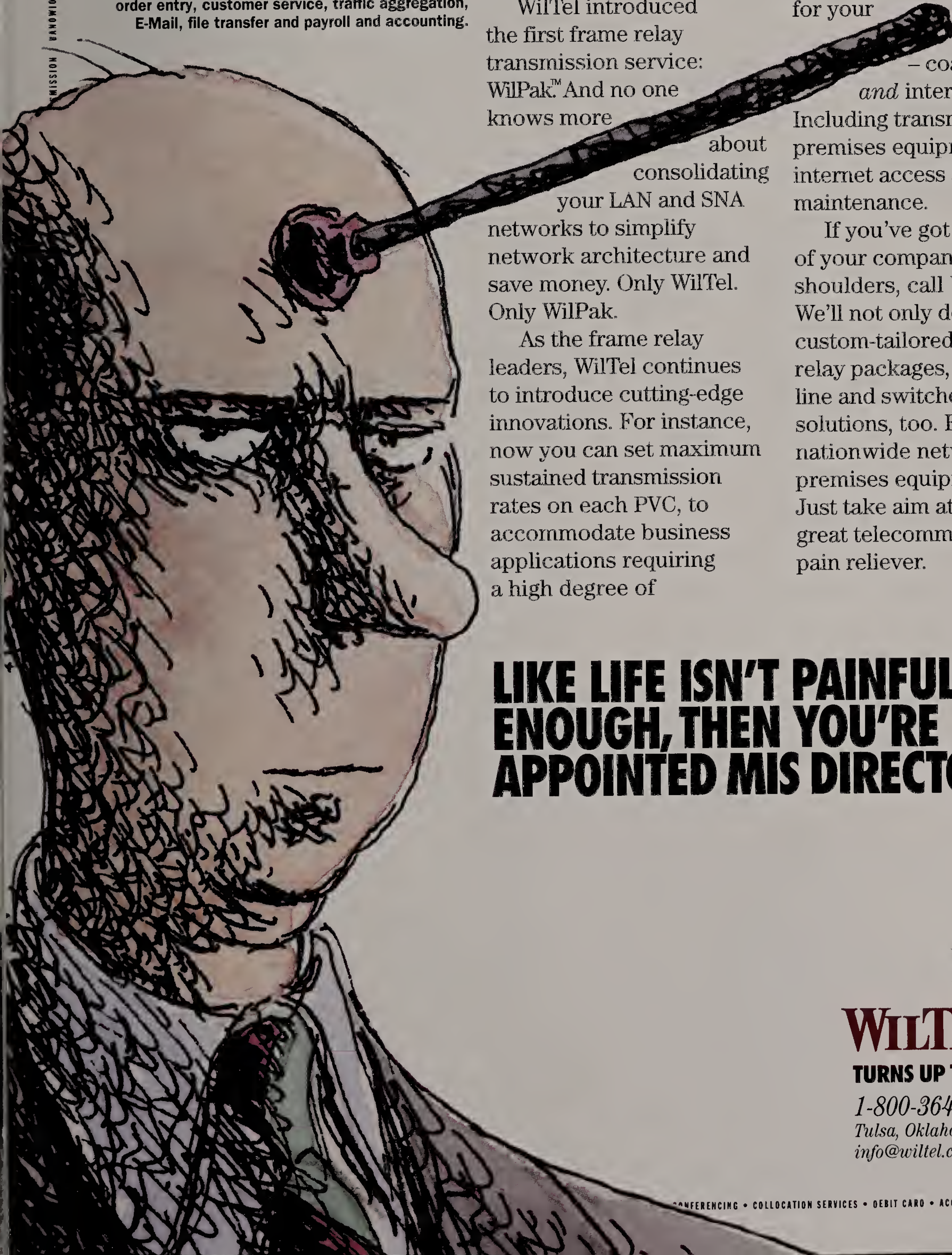

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TRENDLINES

age-tracking system in 1991. The system, known as TotalTrack, features electronic clipboards on which UPS drivers can capture delivery information. Now such information is available online within minutes of delivery, as opposed to a day later under the previous system.

VISIBLE MEANS OF SUPPORT

Fortune 1000 companies don't need all the help they can get. That's the argument of Forrester Research Inc., which believes there are other ways to beef up support operations than simply adding personnel.

A recent Forrester survey of 50 Fortune 1000 firms showed 56 percent plan to increase their support budgets over the next two years, with most of that money being spent on new hires. "End-user support is a weak link in the Fortune 1000 migration to distributed computing," says Heidi S. Dix, an analyst in Forrester's Software Strategy Service. "IS will have to deal with more users, more software packages and much more complex application issues. But the status quo solution of throwing more bodies on the funeral pyre of the help desk won't fix the problem."

Instead, Forrester recommends that companies implement just-in-time support (JITS)—an approach that emphasizes cutting costs, improving utilization of resources and providing new kinds of support and training to meet specific user demands. To implement JITS, companies must employ new products and application features that increase users' self-sufficiency; provide IS with tools to streamline its efforts; outsource support for commodity products so that IS can focus on mission-critical technologies; and restructure the support organization to manage the process.

Dix says that JITS will help companies recover much of the money they waste in downtime when workers don't know how to fix a problem or where to get quick answers to their questions. "Users will be better equipped to help themselves," she says.

CAREER MOVES

Amoco Corp. recently named CARL C. WILLIAMS vice president of information technology. His responsibilities include the overall direction and deployment of IT services throughout the corporation and management of the IS department.

THANOS TRIANT was named vice president of information systems at Times Mirror. Previously director of system architecture at Sun Microsystems, Triant will be responsible for all corporate systems activities at the Los Angeles-based company.

Three recent additions to the information services department at Lands' End are JOHN P. LORANGER, director; DEBRA L. REITZ, senior manager of technology integration; and LINDA L. CHELLEVOLD, senior manager of technical support.

At Inacom, KEVIN DOHRMANN was named to the newly created position of vice president of national systems support/chief technology officer. Employed by Inacom since 1987, Dohrmann will oversee the company's direction in technology use.

Kroger Co. has appointed MICHAEL S. HESCHEL senior vice president of information systems and services. He will direct the chain's management information systems.

EVENTS

Advanced Speech Applications & Technologies (ASAT) '94 Conference and Exhibition

Hyatt Regency, San Jose, Calif.
June 14 & 15
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713 974-6637

This trade show focuses on nontelephony- and telephony-based communications for strategic marketers, R&D specialists, product managers of computer voice-processing companies and industry users of speech applications and technologies. Registration: $895

DB/Expo '94

Moscone Center, San Francisco
May 23-27
Blenheim NDN Inc.
800 2DB-EXPO

This database, client/server and IT exposition and conference will feature more than 700 exhibits and 200 speakers, including representatives from Intel Corp., Gupta Corp. and NCR Corp. In conjunction with the expo, the second annual RealWare Awards will honor exhibitor solutions that demonstrate how IT can be used as a competitive business weapon. Registration: $1,595

ICA Expo Dallas '94

Dallas Convention Center
May 22-26
International Communications Association
800 422-4636

The ICA Expo will focus on management communications issues as a way to explore the future communications needs of Mexico following NAFTA. Sessions will explore historical perspective and give attendees a technological focus on country-specific communications systems currently in place. Conference registration: $300-$900. Expo: $25

GIS in Business '94

San Francisco Hilton and Towers
June 5-8
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Paradox Lost?

After a decade of worry and debate, new evidence indicates that computers may finally be paying off

BY ERIK BRYNJOLFSSON

In the mid-1980s, Morgan Stanley & Co. economist Stephen Roach sounded an alarm about the existence of the "productivity paradox" of information technology: While U.S. firms were investing heavily in IT, those investments did not seem to be paying off. That news was, of course, of great concern to CIOs—and to their CEOs. Supported by a number of studies, the paradox soon became a standard part of the rationale behind many CEOs' reluctance to invest in information technology any further.

While the paradox is still a factor in much investment-related decision making today, it is based on information that may no longer be relevant to the IT investment decision. Some of the most widely quoted studies rely on data from the pre-PC epoch of the 1970s and early 1980s. Furthermore, traditional metrics used to measure productivity ignore some of the key benefits of computerization: increased quality, customer service, product variety and timeliness. My colleague at MIT, Lorin Hitt, and I have found that when these issues are taken into consideration, the outlook for IT takes on a much rosier glow.

ILLUSTRATION BY PETER HOEY

We recently completed a comprehensive examination of productivity in 380 large firms, using more-recent and more-detailed data. Instead of confirming the earlier studies, our results challenge much of the conventional wisdom on computer-enhanced productivity. We found that, far from being unproductive, computers improved productivity significantly *more* than any other type of investment the firms made. The gross ROI averaged over 50 percent per year for computers (including supercomputers, mainframes, minis and micros), compared with less than 10 percent for other types of capital. Even after accounting for the fact that computers need to be replaced more frequently than other types of capital, the net returns from computers still exceeded those from other types of investments by a substantial margin.

Although much more research remains to be done, these and other new findings have begun to change the terms of the IT productivity debate. Even Roach recently conceded that he believes computers may finally be pulling their weight (see "A Resounding Maybe," *CIO*, Feb. 1, 1994).

Our study applied the same basic models of productivity measurement as those used by earlier researchers. But while many earlier studies used aggregate, industrywide data, we used more-detailed data that focused on individual firms. Such data is more likely to re-

"I want to see that hunky Robert Mitchum in 'Pancho Villa Lives.'"

"Without leaving my couch."

veal the benefits of computerization such as improved quality or variety, which can redistribute market share to improve some firms' standing without necessarily affecting the industry as a whole.

In addition, while earlier firm-level studies were based on data from between 1978 and 1982, our analysis used data from International Data Group's computer surveys for 1987 to 1991. [IDG is *CIO*'s parent company.] The currency of data is particularly important because of two trends in the 1980s. First, the amount of computer power delivered in firms increased by at least a hundredfold, making the effects of computerization much easier to identify. Computers represented a relatively small share of capital spending in 1980, so their impact was likely to be drowned out in previous studies by changing oil prices, economic fluctuations and other factors. Second, the past decade was witness to much dramatic and sometimes painful restructuring of business, which may have been necessary to bring many of the benefits of IT to the bottom line.

Our data also included an order-of-magnitude more observations than other firm-level studies. We examined 380 firms over a five-year period; in 1991, those firms generated nearly $2 trillion in sales. While all survey data will include some errors, "lucky" and "unlucky" firms tend to cancel each other out in such a large sample, so a more precise estimate of the factors underlying success can be discerned.

While the findings of high levels of computer-enhanced productivity are encouraging, managers must think twice before going on a computer spending binge. Although computer investment is correlated with higher returns than are other types of capital investments, it does not necessarily follow that companies should increase spending on computers. The average firm in our sample had great success with computers, but the variance in outcomes was large, with some firms far surpassing the average and others actually losing money on their IT investments. The firms with high returns and high levels of computer investment differ from the low performers in many ways that cannot be rectified simply by increasing IS budgets. For instance, "agile manufacturing," involving very intense computer usage, requires fundamental changes in organization, product line, marketing, workforce and supplier relations.

Firm-level data is more likely to reveal the benefits of computerization such as improved quality or variety, which can redistribute market share to improve some firms' standing without necessarily affecting the industry as a whole.

One factory I visited exemplified some of these risks. The company spent millions of dollars on a computerized flexible-manufacturing system to produce a consumer product, but its throughput actually declined compared with what it was under the old, inflexible systems. Closer analysis revealed that rather than taking advantage of the strengths of the new system—faster switching time between products, more potential product variety, better coordination with suppliers and less need for work-in-process inventory—the managers and the workforce were still trying to run the factory the old way. Top management had described an appealing vision for the future, but without hundreds of adjustments—some minor and some major—that vision could not be implemented. Everyone slipped back into their old organizational routines, and the computers added little value.

Fortunately, this story has a happy ending, as did the projects in most of the companies we analyzed. The company set aside a "greenfield" site in a corner of the factory where the new methods would be pioneered by a small group of employees and managers. The team worked out how the pieces of the new system, including both organization and technology, fit together. Once it was better understood, the system could be successfully extended to the rest of the factory.

In this case, the full benefits of the new system could not be achieved until the organizational changes were made. In other cases, management may consciously use the technology as a catalyst to force a reexamination of long-held beliefs and to justify the reengineering of outdated systems. In this way, even a relatively small investment in computers can unleash a groundswell of productivity. This may explain why IT was associated with such enormous productivity in our sample. Similarly, the fact that such organizational changes do not happen overnight may help explain why the productivity payoff did not occur sooner.

As the era of simple automation draws to a close, IT must increasingly be viewed as an enabling technology that provides an advantage by facilitating business-process redesign and improving the ability of groups to work together. The lesson for IS managers is clear: It is no longer possible to exploit the full potential of IT simply by running an efficient IS shop. Instead, exceptional returns are driven by linking technology with strategy and structure. It is by using IT to reinvigorate business processes that CIOs can gain proof of their own that the productivity payoff has arrived.

Erik Brynjolfsson is an assistant professor at the MIT Sloan School of Management in Cambridge, Mass. His report, "New Evidence on the Returns to Information Systems," is available from the MIT Document Services office at 617 253-5668.

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The Distributed Dilemma

An annual survey of CIOs by Deloitte & Touche turns up plenty of nettlesome problems—and an accompanying shortage of ideal solutions. As the stakes and expectations soar, so do the manifest difficulties of being a CIO.

BY JEFF PLEWA

Each year the Information Technology Consulting Group of Deloitte & Touche surveys U.S. and Canadian CIOs to identify IS trends and plans. This year's responses, from more than 400 companies, showed important shifts in everything from client/server architecture and software-development tools to reengineering projects and open systems.

As soon as the results were tabulated, Deloitte & Touche Information Technology Consulting Partners Jeff Plewa, Steve Pliskin and Ken Horner, along with CIO *Magazine Editor Marcia Blumenthal, met with five CIOs of major corporations to get senior industry perspective on the survey findings. Plewa, director of the CIO survey, now in its sixth year, moderated the discussion. The industry participants included Roger Brooks, CIO of Allied Van Lines; Kenneth DeWitt, senior systems director at Sears Merchandise Group; Richard Haugen, vice president for information systems at Molex Inc.; Donald Karmazin, CIO of the Chicago Board of Trade; and Hank Leingang, CIO of Viacom International Inc.*

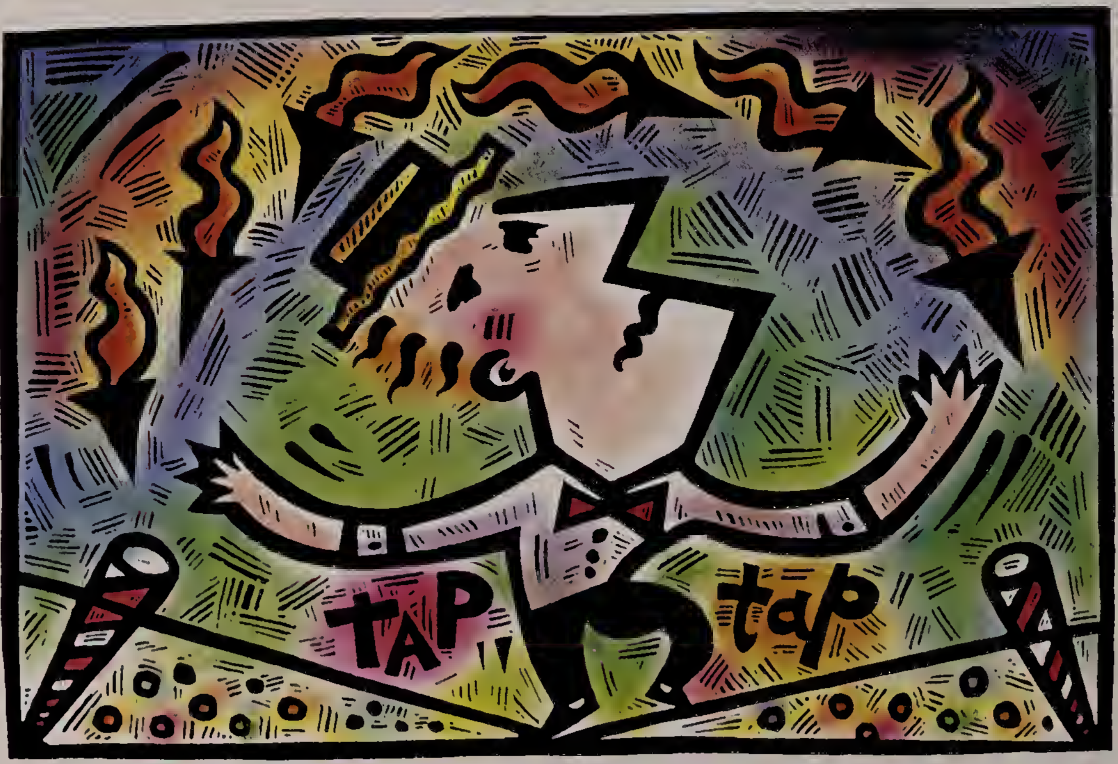


ILLUSTRATION BY FRAN O'NEILL

1993 was another challenging year for CIOs. As the economy and corporate performance limped along, growing importance was placed on efforts to improve service and quality, support global expansion and undertake corporate rightsizing initiatives. In addition, reengineering—like Gen. Sherman marching to the sea—continued its surge through organizations. Finally, executives across the board were again pressured to accomplish more with less.

It is indisputable that improved performance has become an urgent goal of companies in the United States and Canada. Much of the responsibility for achieving that goal has fallen squarely on the shoulders of CIOs—who at the same time confront a rapidly changing technical paradigm. Deloitte & Touche's annual survey of CIOs looked at many of the friction points, including the five that follow.

Client/Server

Although the demise of the mainframe has been greatly exaggerated, client/server projects proliferated in 1993 at a furious pace. In the most dramatic finding of this year's survey, CIOs reported a more-than-fivefold jump in the use of client/server systems. In 1993, more than one-quarter of all applications (27 percent) ran on client/server systems, up from a mere 5 percent in both 1991 and '92. Moreover, 93 percent of respondent CIOs expect this figure will double by 1995.

(The survey turned up an interesting correlation between a high degree of involvement in client/server and above-average IS budget growth. Companies with 25 percent or more of their applications running on advanced client/server systems [defined as encompassing such things as remote-database access, distributed functionality, and distributed data and functionality] posted budget gains averaging 9 percent; those with fewer than 25 percent of their applications running on client/server saw their budgets decline by 1 percent.)

Unfortunately, this burgeoning comes at a time when a shortage of staff with client/server experience remains daunting: 54 percent of respondents cited the lack of qualified personnel as an obstacle to client/server implementation (see chart). This highlights the pressing need for significant training expenditures.

Our panel of CIOs points to a number of factors in explaining the rapid growth of client/server. Chief among these are the improving capability of client/server hardware, software and human resources. Viacom's Hank Leingang credits "the maturing of the technology, more-rigorous operating environments, better tools and more people with client/server expertise."

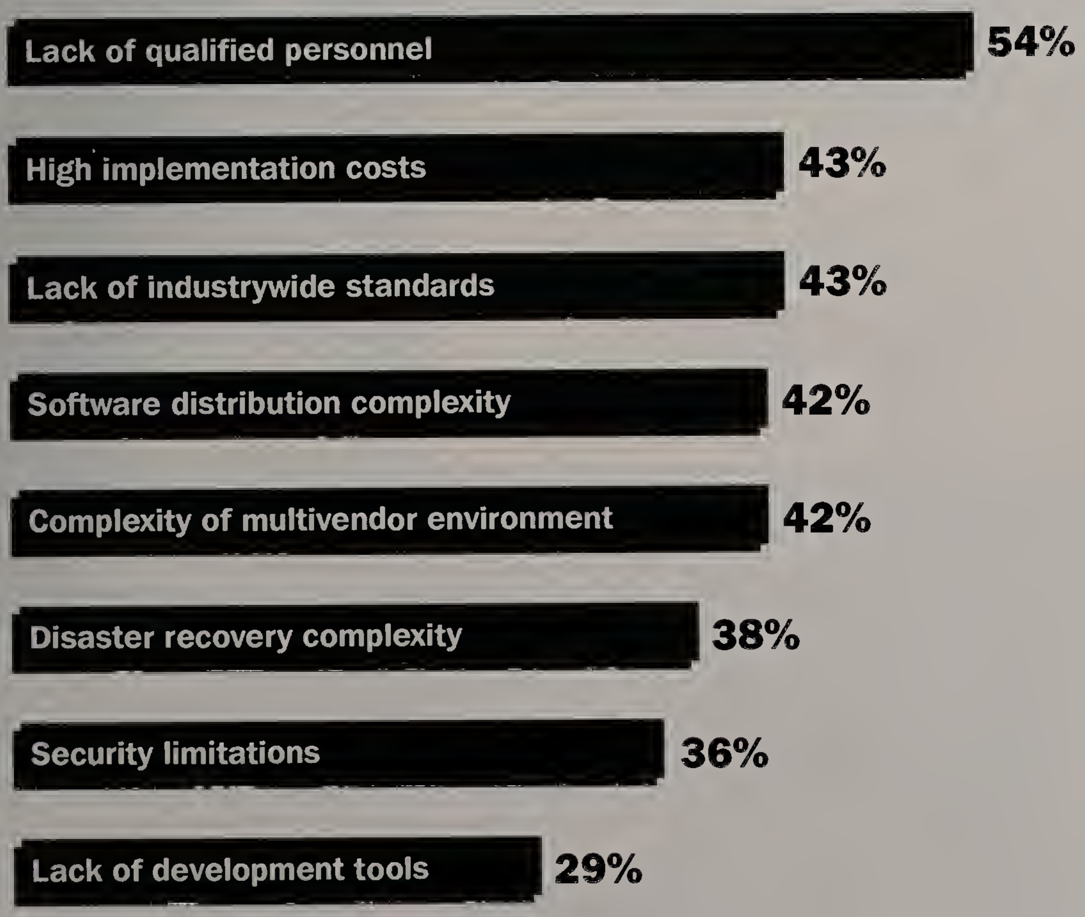
Richard Haugen, of Molex Inc., agrees, noting that although his company did not initially adopt client/server, "new developments have made it an increasingly viable option."

Nonetheless, caution hasn't exactly been cast aside. According to Roger Brooks of Allied Van Lines, his company initiated a client/server project in 1990 but later backed away to give the technology time to mature. "For our environment, we found that the technology was just not there yet," he says. "However, we will be ready to investigate client/server again next year."

Significantly fewer reengineering projects seemed to be in the works this year: The number of projects per company dropped to 3.2 from last year's level of 4.4.

Obstacles to Implementing Client/Server Systems

Percentage of CIOs perceiving the obstacle as significant



Kenneth DeWitt reports that Sears Merchandise Group is in a similar position. "We are bringing seven MIS divisions together under one umbrella. As a result, there are a lot of redundant systems and data right now. We are moving cautiously because the client/server approach is not as mature as we think it should be. If it were, we would be more aggressive now."

Caution turns out to be the hallmark of most migration curves. The survey identified a trend toward using an evolutionary approach to implementing client/server architecture: beginning, typically, with a GUI front end to current legacy systems, then proceeding to more-advanced forms of client/server architecture, such as distributed functionality and distributed data. The Chicago Board of Trade's Don Karmazin sees many companies initiating the move to client/server by unintelligent workstations with intelligent front ends—"to give them a new look and feel." (According to Leingang, once users get a taste of GUIs, they demand nothing less in future applications and turn off to character-based systems.)

Legacy Systems

The obvious corollary to the 27 percent client/server-conversion rate is that a lot of mission-critical applications still run on legacy systems—69 percent, according to this year's survey. Of those polled, 38 percent expressed dissatisfaction with their legacy systems, and 87 percent said they plan to take some remedial action within the next several years (most to replace them but many to expand or redesign them).

Says Karmazin: "I think you'll have many legacy systems in place for years to come....I think these older systems will be integrated or interconnected, but they won't go away."

The barrier to replacing legacy systems most frequently mentioned by respondents (69 percent) was the

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part·ner·ship (pärt´nər-ship´) *n* **1.** The state of being a partner; an association of partners. **2.** A contract entered into by two or more persons in which each agrees to furnish a part of the capital and labor for a business enterprise, and by which each shares in some fixed proportion of profits and losses.

–The American Heritage Dictionary

If there is one word that defines the ESPRIT Awards it's *"partnership."* This program honors those business and technology executives who have joined forces to plan the acquisition of information technology, implement it and quantify its strategic business value in both hard-dollar and soft benefits.

Recognizing Strategic Partnering

CIO and Booz·Allen & Hamilton created the ESPRIT Awards to recognize this spirit of cooperation as well as the ability to prove a positive and sustained impact on the bottom line from strategic IT investments. By communicating the payback of your technology solution, *CIO* and Booz·Allen & Hamilton hope to encourage other businesses to follow your lead.

Obtaining Real Business Value

What business goals have you achieved with your technology solution? Lowered costs? Raised profits? Increased market share? Enhanced image? The list is endless. There are both hard-dollar and soft benefits that come with IT investments. If you and your business partner can provide tangible facts and figures about return on investment from information technology, we urge you to participate in the ESPRIT Awards program.

Our Challenge To You

If your technology investment is paying off, we want to hear about it. To participate, simply fill out this ESPRIT Awards application. The January 15, 1995 issue of *CIO* will feature profiles of companies, government agencies and nonprofit organizations that successfully document how their partnered IT investments have increased business value.

Then in early 1995, *CIO* and Booz·Allen & Hamilton will host a special awards ceremony honoring these winning organizations.

For additional information, please contact Brooke Burton at (508) 935-4449.

ESPRIT Awards Timeline

Applications Due:
May 16, 1994

Judges Select Winners:
September 1994

Announcement of Winners:
January 1995

Awards Ceremony:
Winter 1995

The 1994 ESPRIT AWARDS

Honoring Excellence in Strategic Partnering for Return from Information Technology

Sponsored by CIO Magazine and Booz·Allen & Hamilton

STATEMENT OF PURPOSE

While most executives are aware of the potential benefits of information technology (IT), some remain unsure of its actual value to their organizations. In order to demonstrate how strategic IT investments initiated by a joint business/IS team can produce both hard-dollar and soft benefits, *CIO* Magazine and Booz·Allen & Hamilton are cosponsoring the second annual ESPRIT Awards. The honorees will be public and private companies, government agencies and not-for-profit organizations which have proven that strategic IT investments can have a positive and sustained impact on the bottom line. Winners will be honored at an awards ceremony and profiled in the January 15, 1995 issue of *CIO* Magazine.

CRITERIA

Winners will be chosen by a panel of independent judges from among entrants who have sent in completed application forms by May 16, 1994. Entries will be judged on the following criteria:

- The extent to which the system furthers the organization's strategic objectives.
- The measurable financial return the system provides to the organization.
- The level of partnership achieved throughout the course of the project by the business unit and the IS organization.
- The extent to which IT was key to the achievement of the overall business solution—the "couldn't have done it without technology" factor.

Telephone interviews, and in some cases face-to-face interviews, will be requested by the Booz·Allen screening teams. These teams may elect to visit the applicants' sites in order to review in greater depth the system and the environment in which it is functioning, and to examine financial results.

DEADLINE
May 16, 1994

MAIL TO
ESPRIT Awards
CIO Magazine
492 Old Connecticut Path
PO Box 9208
Framingham, MA
01701-9208

ENTRY GUIDELINES

- The system must have been *operational* prior to July 1, 1992.
- Entries must be made jointly by the IS executive AND the business-unit executive for whom the system delivers value.
- Entrants must agree to be featured, along with their system and organization, in a *CIO* article.
- Entries must be complete. Incomplete entries may be returned for elaboration or disqualified.
- Entries must be on 8.5x11-inch paper, one side per sheet.
- The application form may be reproduced.
- Multiple entries from one company will be considered, but each entry must be submitted separately.
- Vendors, public-relations and advertising firms, consultants and other third parties may NOT apply on behalf of another firm. They are encouraged to forward this form to the "owner" of the system, or to contact *CIO* Magazine to recommend that an application form be sent to their client.
- All entries must be computer-generated or typed; no handwritten entries will be accepted.
- When feasible, an additional copy of the entry should be sent on a 3½ -inch disk. Electronic entries must be limited to word-processing and spreadsheet packages that are compatible with *Microsoft Word* and *Microsoft Excel* on an IBM or Macintosh platform.

1. COMPANY/BUSINESS UNIT

NAME OF PARENT COMPANY:

CITY, STATE WHERE HEADQUARTERED:

IF A COMPANY, IS IT ☐ PUBLICLY HELD? ☐ PRIVATELY HELD?

ANNUAL REVENUES:

INDUSTRY:

NAME OF BUSINESS UNIT OR ORGANIZATION:

CITY, STATE WHERE LOCATED:

NUMBER OF EMPLOYEES AT BUSINESS UNIT:

2. ENTRANTS

NAME OF ENTERING BUSINESS-UNIT EXECUTIVE:

TITLE:

NAME OF DIVISION, DEPARTMENT OR UNIT:

ADDRESS:

CITY:

STATE: ZIP:

TELEPHONE: ( ) FAX: ( )

NAME OF ENTERING I.S. EXECUTIVE:

TITLE:

NAME OF I.S. ORGANIZATION:

ADDRESS:

CITY:

STATE: ZIP:

TELEPHONE: ( ) FAX: ( )

3. SUPPORTERS

Please list four people who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or represent suppliers, customers or others intimately familiar with the system.

A. NAME:

TITLE:

TELEPHONE:
( )

REASON FOR INCLUSION:

B. NAME:

TITLE:

TELEPHONE:
( )

REASON FOR INCLUSION:

C. NAME:

TITLE:

TELEPHONE:
( )

REASON FOR INCLUSION:

D. NAME:

TITLE:

TELEPHONE:
( )

REASON FOR INCLUSION:

4. THE NOMINATED ORGANIZATION

Please tell us about your organization (company, business unit, agency) in 500 words or less. Include information on:

- when the organization was founded;
- mission statement;
- major products and services;
- markets served;
- any other data you believe to be relevant in terms of general background.

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to the organization by completing the following sections. Please limit your material to five pages.

- **Objectives:** Identify the primary business objectives of the IT investment.
- **Scope and Impact:** Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business. Identify other business-change initiatives tied to the IT investment.

- **Furthering Strategic Objectives:** Describe how the technology investment is furthering the organization's strategic objectives, including any new business initiatives. Note any significant event that would help us evaluate the nominated system's value. Examples might include a merger, a new distribution channel or a significant regulatory change.
- **Partnership:** Describe how the business unit and IS organization worked together throughout the project—from concept to implementation. What were the specific tasks fulfilled by the business unit? IS organization?
- **The Importance of IT:** Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change. Could the results have been achieved without IT?

6. TECHNICAL PROFILE

Briefly describe the technology of the nominated system. Please include the names of major vendors and products. If you prefer, you may attach a document containing a technical description of the system, providing it is no more than five pages.

NOTE: The examples provided here are meant to be illustrative, not all-inclusive.

- **Architecture** (e.g., client/server, distributed, mainframe)
- **Hardware** (e.g., mainframe/parallel processor, minicomputer/server, desktop computers, handheld/portable devices)
- **Software** (e.g., operating systems, database system, shells, application software)
- **Software development tools** (e.g., CASE, 4GLs, GUI developers, object-oriented development tools)
- **Networking/communications hardware, software and services** (e.g., modems, routers, electronic-mail packages, carriers and public networks)

7. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the application is to be considered. Unsigned releases will invalidate the entry.

I hereby state that the information provided is true and complete to the best of my knowledge and belief.

I authorize the release and use of, in connection with the ESPRIT Awards program, any and all materials furnished by me or others at the company contacted for this judging. I understand that information submitted on this application or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the ESPRIT Awards program.

I also authorize the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for CIO *Magazine. I agree that no compensation shall be due me or my company for such usage.*

I recognize that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of the sponsors.

SIGNATURE OF NOMINATING BUSINESS EXECUTIVE:

DATE:

SIGNATURE OF NOMINATING I.S. EXECUTIVE:

DATE:

8. OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in *CIO* Magazine? Yes ☐ No ☐

How did you learn about the ESPRIT Awards program?

☐ *CIO* Magazine
☐ Booz·Allen & Hamilton
☐ IS staff member
☐ Other publications
☐ Vendor
☐ Academician
☐ Consultant
☐ Systems integrator
☐ PR Agency
☐ Advertising Agency

☐ Other (please identify) ______

CHECKLIST

Have you filled out...?

☐ Company/Business-Unit, Entrants and Supporters Information
☐ Return on Investment Chart

Have *both* entrants signed and dated...?

☐ Truth of Information/Release

Have you included on separate pages...?

☐ Nominated Organization
☐ Nominated System
☐ Technical Profile
☐ Additional Return on Investment Material

Have you checked off...?

☐ Other Editorial Opportunities
☐ How you learned about the ESPRIT Awards program?

9. QUANTIFYING RETURN ON INVESTMENT

Directions

- The table below provides a framework for identifying costs and benefits. Feel free to break down any line item into additional components, or to add new line items if necessary. Please explain how the figures were arrived at, on separate sheets if necessary.
- In quantifying costs and benefits, every effort should be made to quantify strategic and "intangible" benefits (e.g., competitive positioning, risk management). It would be helpful to attach any documents you have prepared that explain the system's costs and benefits.
- You may also include your own return on investment calculations and frameworks to further explain your return on investment. These can be attached to your application form.

Guidelines for Quantifying Return on Investment

- Provide return and investment figures five years out from initial implementation. If the system has been in operation for less than five years, you may project future investments and returns *based on historical data*.
- All investments and expenditures made before implementation should be included in year "zero."
- Distinguish actual costs and benefits from projected costs and benefits.
- To the extent the nominated system replaced older technology, the system investment reflected in the tables should be net of corresponding salvage values and ongoing costs.
- Return and investment figures should be stated on an approximated after-tax basis.

NOTE: The examples provided below are meant to be illustrative, not all-inclusive. All numbers are subject to verification.

Investment:	**Year "0"** 19___-19___	**Year 1** 19 ____	**Year 2** 19 ____	**Year 3** 19 ____	**Year 4** 19 ____	**Year 5** 19 ____	**TOTAL**
Technology purchases (e.g., hardware, software, lease payments, amortization)							
System development and implementation (e.g., systems integration and consulting fees, initial training)							
Ongoing system maintenance and enhancement (e.g., updating system, maintaining and replacing software, adding users)							
Ongoing system operations (e.g., ongoing training and consulting, help desks, other ongoing support)							
Nonsystems operational charges (e.g., increased labor or inventory, early retirement program for laid-off employees)							
Total Annual Investment	**$**	**$**	**$**	**$**	**$**	**$**	**$**

Total Investment: $

Return:	**Year 1** 19 ____	**Year 2** 19 ____	**Year 3** 19 ____	**Year 4** 19 ____	**Year 5** 19 ____	**TOTAL**
Incremental profits from enhanced revenue (e.g., new revenue streams, productivity improvements)						
Reduced operating costs (e.g., labor, material)						
Reduced capital investments (e.g., capital equipment)						
Reduced inventory						
Indirect cost avoidance (e.g., avoided hiring, fines, fees)						
Total Annual Return	**$**	**$**	**$**	**$**	**$**	**$**

Total Return: $

Total Return on Investment: $
(Total Return minus Total Investment)

1993 ESPRIT Award Winners

AT&T Universal Card Services

Marian Browne, *Vice President,*
Customer Relationships
Leslie Palmer, *Vice President,*
Emerging Technologies

City of Chicago, Bureau of Parking

Judith Rice, *City Parking Administrator,*
Bureau of Parking
Paul Vallas, *Director of Revenue,*
Department of Revenue

Complete Health Services Inc.

William W. Featheringill, *President & CEO*
Richard Harley, *Director of MIS*

Los Angeles County, Department of Public Social Services

Ray Garcia, *Bureau Director,*
Bureau of Administrative Services
Lisa Nunez, *Division Chief,*
Computer Services Division

South Florida Water Management District

John Lynch, *Department Director,*
Information Systems
James D. Yager, *Assistant Executive Director*

SynOptics Communications Inc.

John Dick, *Chief Information Officer*
William J. Ruehle, *Vice President & CFO*

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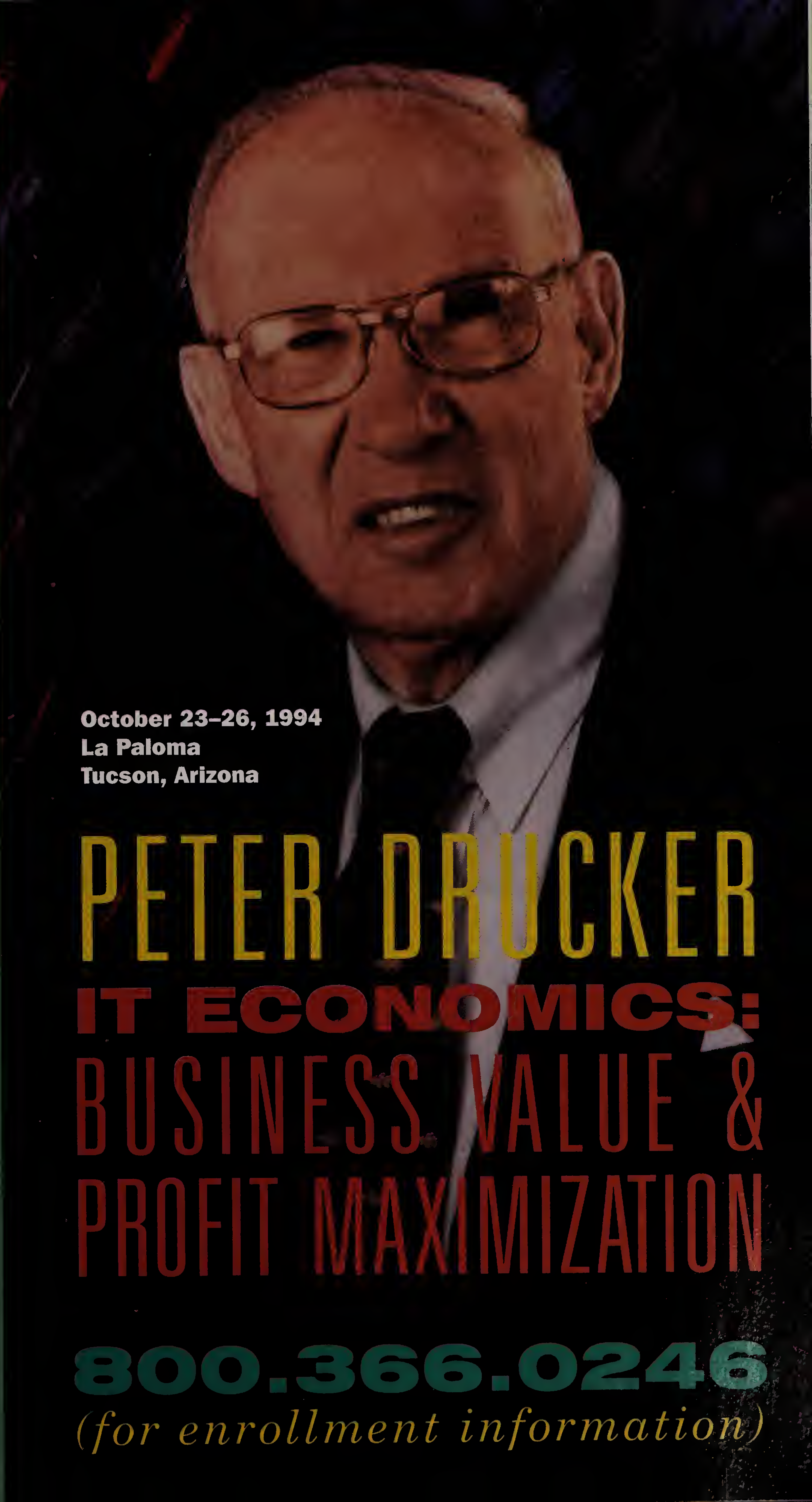

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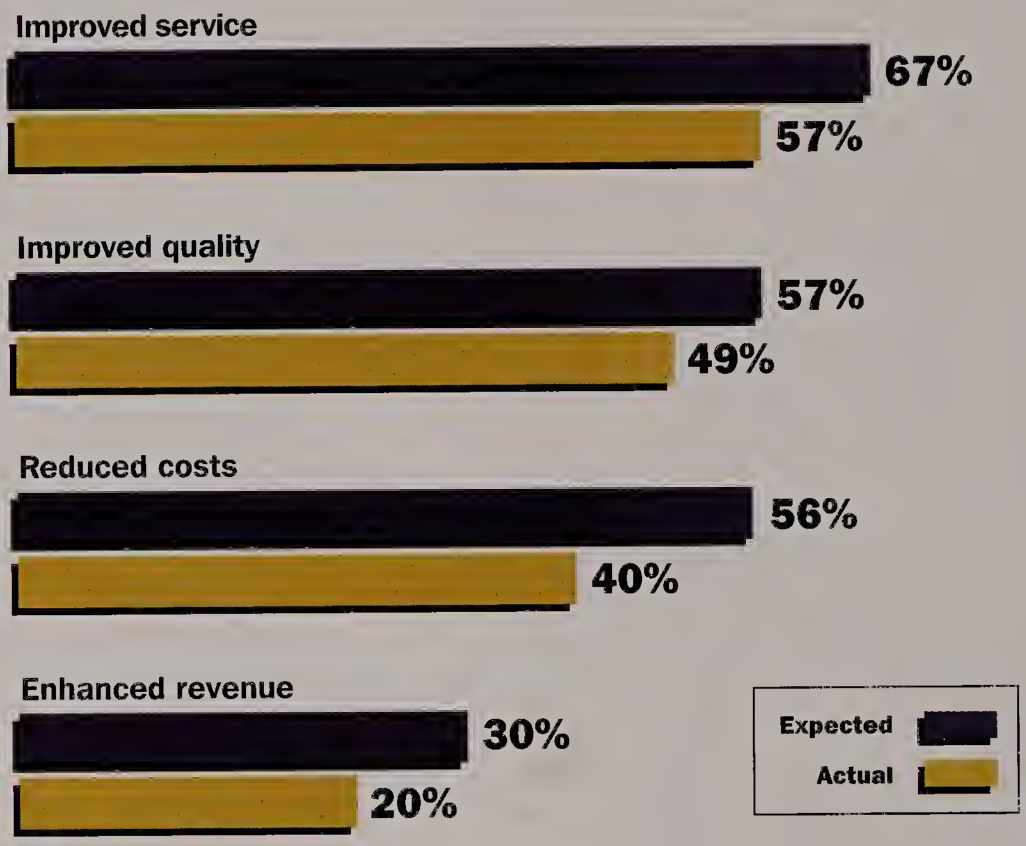
high cost; 48 percent mentioned competing IT projects claiming a higher priority; and 46 percent mentioned the risk of business disruption inherent in switching to less-battle-tested platforms.

Benefits of Business-Process Reengineering

Percentage of respondents naming the benefit as a goal and reporting that it had been achieved



Brooks shares the concerns about cost constraints and the need to balance priorities. "I want to invest my resources in the strategic systems—the ones that produce some real value added for the customer and give me a competitive edge," he says. "If a basic [mainframe] system, such as payroll, is not broken, don't fix it."

On the other hand, notes Karmazin, "If you're at the end of the curve on your mainframe configuration, a client/server application is a lot less expensive then adding another mainframe."

Reengineering

Not surprisingly, business-process reengineering was on respondents' minds. Less predictably, though, significantly fewer reengineering projects seemed to be in the works this year: The number of projects per company dropped to 3.2 from last year's level of 4.4. This decline may be only apparent, however, since the definition of business-process reengineering used in the current survey questionnaire was revised to be made more strict: "the radical change of critical business processes and their supporting systems to effect breakthrough gains in performance."

Whether the decline is real or merely semantic, satisfaction with the results of reengineering has risen over last year's study. Improved service was the benefit from which CIOs expected—and got—the best results (see chart). This strong showing surprises Haugen. "Reengineering can be a process in search of a mission," he says. "Now it's the 'in' thing, and this can lead to a lot of failures."

But DeWitt believes the happier outcomes may be the result of practice, practice, practice. "Reengineering is an art in itself," he says. "People have to learn the process and then build on their successes." Leingang speculates that "companies may be launching projects that are smaller in scope" and thus likelier to produce better results more quickly.

Although Deloitte's Ken Horner agrees that higher satisfaction rates are probable with smaller projects, he questions whether they produce as much real value as those with more-ambitious goals. "The bigger your ideas are, the higher the risk of failure," he says. "But if you succeed, the better the chance you will make a major improvement."

A narrowing this year of the gap between expected and achieved benefits may also be the result of more realistic expectations; early experiences may have taught companies to adjust their targets in subsequent projects.

Asked to name significant barriers to reengineering success, 59 percent of respondents made "resistance to change" the top vote getter by a wide margin—over "limitations of existing systems" (40 percent), "lack of executive consensus" (38 percent) and "lack of a senior executive champion" (37 percent).

Brooks says change resistance is especially problematic in the quasi-franchise environment at Allied (and typical of the moving/storage business as a whole): "We're challenging the basic structure and foundation of the way work is performed within our company and the industry. Our independent owners understandably want to know what's in it for them."

Development Tools

The spread of client/server drove another 1993 trend: Use of software-development tools rose, according to the survey, and client/server tools were the applications cited most often by respondents. Three-quarters of those polled said they used client/server tools to some extent, and nearly one-quarter reported significant use. Possibly helping to spur their growth is the fact that, as Leingang notes, "client/server tools provide quicker feedback in a prototyp-

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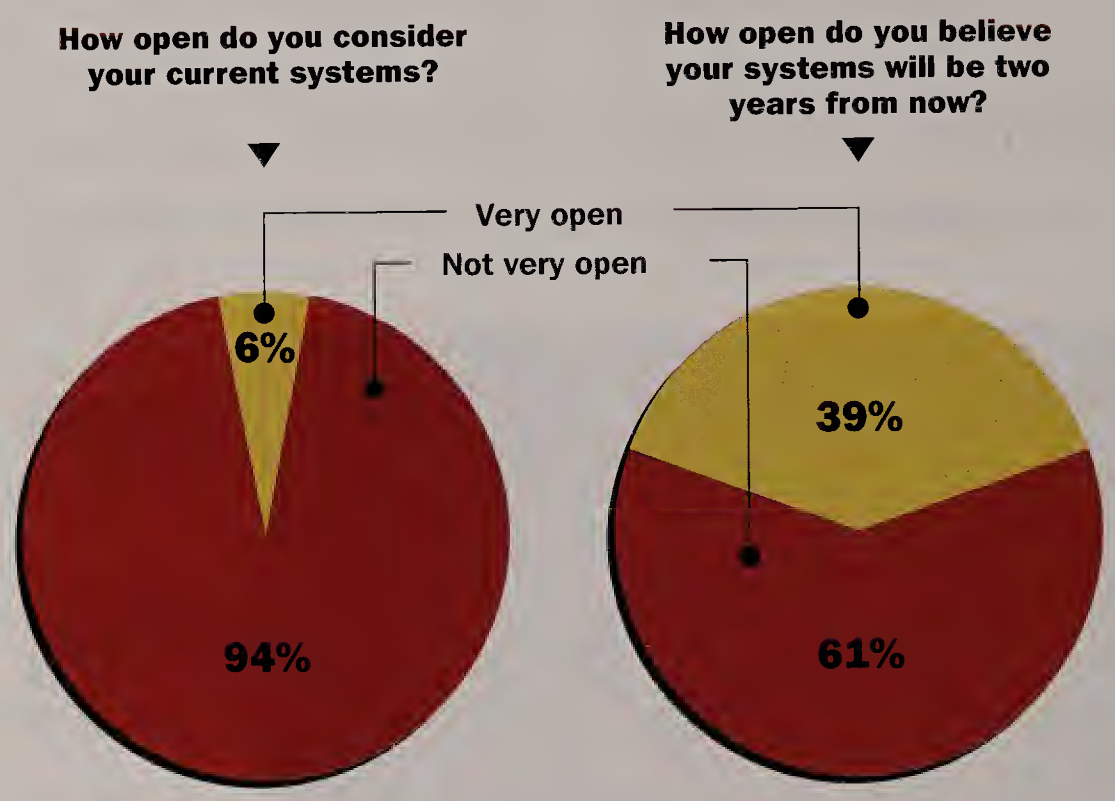

Open Systems: Pursuit and Achievement

ing environment. They speed up the process, and people can see their impact sooner."

Use of CASE tools also grew but at a slower rate than survey respondents had predicted over the last few years. Just over half of the respondents are using CASE. Brooks cites the overheated expectations and relatively high cost of CASE as possible reasons for the "go-slow" posture: "Everybody thought CASE tools would be a marvelous productivity enhancer, but productivity didn't really improve all that much," he says. "You got better documentation and a better-quality product, but the delivery was not there, and it was hard to justify the cost."

Leingang believes the development-time lag for CASE tools is another problem. "After a new technology comes on stream, it takes two years to develop the appropriate CASE tools. Then you've got this tool that's supposed to be a silver bullet, but all of a sudden you're faced with yet another new technology—and the bullet won't go with you."

The growth of object-oriented tools—used to at least some degree by 37 percent of survey respondents—also lagged behind predictions in earlier surveys. (With 13 percent of health-care industry respondents claiming extensive involvement in object-oriented tools, health care was the survey's leading proponent of object-tool use.)

The seemingly endless journey to the Shangri-La of open systems continues apace.

The slow development of an object mandate makes sense to Haugen, who notes that "if CASE tools have a significant learning curve, the object-oriented curve is astronomical."

Open Systems

The seemingly endless journey to the Shangri-La of open systems continues apace. Seventy-one percent of survey respondents are pursuing some form of open systems. Despite this, only 6 percent of those polled claimed to have achieved "very open" architectures by the end of 1993 (see chart). This may arise from a highly ambitious and comprehensive view of the term, according to Karmazin. "When people say 'open,' in my experience they are trying to achieve interoperability, portability and productivity," he says. "You need a strategy for building openness into your legacy systems as you change each piece of the environment."

Many panelists voiced concern over the degree of openness and the benefits that are realistically achievable. "The concept of an open system is that your system is transportable, so you can keep your hardware costs down," says Leingang. "But hardware is a less expensive component of the system. Costs of training and development continue to rise. So I wonder if the expectation of cost reduction is reasonable."

In a recent application-selection project, Haugen says Molex was pleased with the variety of "open" options available. Karmazin concurs, noting that initially, a buyer has all the options and can bid vendors down. He cautions, however, that "once you choose an extension, you limit portability."

"I see us moving toward more loosely coupled systems," Horner says. "Once you choose Unix, you're no longer open to any of the good ideas that exist in an AS/400 environment, and there are some good ones. There's no one single flavor of ice cream that's the only good one."

Brooks believes much of the open-systems debate is led by vendors. "I talk to my peers around the country, and most CIOs have become pretty skeptical about some of these new technologies. We are sitting back, with kind of a cocked eye, waiting for somebody else to figure out the problems." Karmazin agrees that a lot of the hype is vendor-generated. "You have to draw a line in the sand with your systems and stick with it," he says. "You can't just keep changing to the next new thing." CIO

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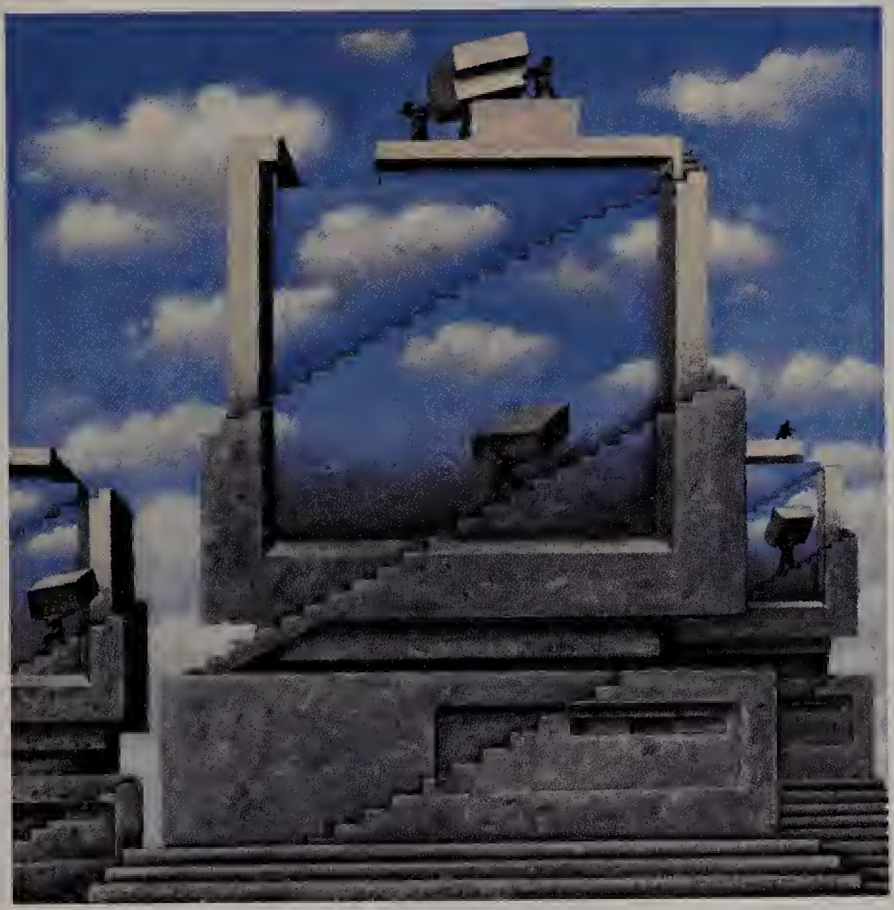

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PREPARING FOR CHANGE

Uncertain Diagnosis

Industries in flux place exceptional burdens on IT organizations, which must meet goals that are not clearly defined and needs that may change daily. In the first in a series of articles on coping with change, *CIO* looks at health care.

BY RICHARD PASTORE

It's the year 2000. At the head office of the Massachusetts Bay Healthcare Network, a two-year-old alliance of 300-plus hospitals and other treatment centers, CIO Maureen Hamilton confers with one of her staff MDs. The new interface on the clinical pathways system is getting high marks from physicians, he reports: They're finding it a lot faster to drill down to the most cost-effective recommended procedures. Also, the legislative liaison says the feds are likely to ask for more-frequent outcome reports to feed their quality-comparison data bank. Finally, another nursing home in Salem has been accepted into the network. Adding the node will be no problem, but the home's old systems will need modifications to accept the revised Common Patient Identifier.

THUMBNAIL

Industry: U.S. hospitals and affiliated health-care providers

Primary Products/Markets: Hospital services, patient care

Industry Revenues: $289 billion (1991 figures)

Number of Players: 6,539 (American Hospital Association figures)

FORCES OF CHANGE

Managed Care: The revenue model shifts from fee-for-service to "capitation," which requires providers to treat patients for a preset fee and absorb any additional costs incurred.

Impact: Clinicians will require systems to help them choose treatment methods that limit hospital costs while delivering quality care. Organizations must closely track costs and resource-utilization levels.

Integrated Continuum of Care: Providers become responsible for an individual's care across a continuum of facilities, including hospitals, outpatient clinics, long-term care, rehabilitation centers, etc.

Impact: Individual health-care institutions must be linked electronically and able to access common databases to share standardized patient records.

Quality- and Cost-based Competition: Hospitals compete for spots on preferred-provider lists of subscribers, insurers and physicians based on their ability to deliver quality care at the lowest cost.

Impact: Providers must report treatment outcomes and cost metrics to subscribers and regulatory agencies.

ILLUSTRATIONS BY JAMES YANG

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I.S. ACTIONS

NOW:

Installing wide area network and EDI technology to link provider facilities and enable data sharing.

Constructing clinical-data repositories that merge inpatient and outpatient medical histories that eventually can be shared across a provider network.

Implementing physician order-entry expert systems that encourage doctors to order tests and procedures that are effective and cost-prudent.

Developing applications to support (and attract the business of) ambulatory-care sites such as off-site physician offices and walk-in clinics.

LONG-TERM:

Design systems that report patient-care outcomes to subscriber and governmental organizations.

Seamlessly integrate systems at affiliated and acquired institutions to provide smoother interaction for patients and employees.

Implement "clinical pathways" expert systems that guide clinician diagnosis and treatment decisions.

Today, the business of health-care providers is being remade from top to bottom, and the role of health-care CIOs is being transformed along with it. Buffeted by market forces, state legislation and inevitably federal reforms, centuries-old revenue structures are being dismantled, organizational boundaries torn down. Even the industry's basic mission of treating the sick will be touched by these forces, accelerating the shift from doing whatever's necessary to cure people to doing whatever it takes to keep people healthy and out of the hospital.

> *"We need to sell our vision and show management the long-term advantage of IT investment versus investing in a new MRI scanner or parking lot."*
>
> –JOHN A. PAGE

To manage in any changing industry, the first step is understanding the business and where it's heading. For health-care CIOs, this means communicating with senior management, clinical staff and external organizations working out health-care policies and standards. "This industry's been static for years, and IS has had our sheltered niche for a long time," says Galen Briggs, vice president and CIO at Sisters of Charity Healthcare System Inc. in Cincinnati. "Now that we're in an environment that's constantly being reinvented, we have to get out into the senior-management ranks."

The IS department must also become more conversant and entwined with the clinical side of the business, something not very common today. "We will become more medically oriented, with MDs on the IS payroll," says John Glaser, CIO at Brigham & Women's Hospital in Boston. Glaser employs four doctors in his department, one full time.

Another future fundamental: Organizations will be investing considerably more in information technology. Health-care providers spent $7.5 billion on IT last year. That figure will balloon to $11 billion by 1996, according to Sheldon I. Dorenfest, industry consultant and president of Sheldon I. Dorenfest & Associates in Chicago.

Such rapid escalation is not surprising, considering the burdens industrywide change will place on information technology resources. In the future, health-care providers will link regionally to pool their strengths, offer the greatest spectrum of services and avoid costly duplication of efforts. That means the IS organization will have to build the communications infrastructure required to link disparate sites. It must also develop new applications to analyze and report data on treatment quality and its relation to cost.

Though it should be obvious to management that substantial information technology investments will be needed, nobody's handing out blank checks. For this reason, it becomes more important than ever that CIOs act as educators and lobbyists to extract the required resources.

"We need to sell our vision and show management the long-term advantage of IT investment versus investing in a new MRI scanner or parking lot," says John A. Page, executive director of the Healthcare Information and Management Systems Society (HIMSS), headquartered in Chicago.

This challenge may prove especially frustrating for unempowered IS chiefs who so far have been excluded from strategic planning. "The need for the CIO to sit at the table has never been more important, and it's becoming more recognized by senior management," says William C. Reed, chairman of the College of Healthcare Information Management Executives (CHIME), a national fellowship of health-care CIOs based in Ann Arbor, Mich. "But our members say there's still a long way to go there."

"I'm very worried that IS is not correctly positioned to be sure its considerations are given as much weight as they need in the face of change," agrees Robert Messier, director of management information services at Beth Israel Hospital in Boston. "We haven't been in the strategic inner circle historically, and there has been insufficient attention paid by that circle to the issues of IS," he adds.

COMMON THREADS

IS executives in industries undergoing dramatic change should:

Gain insight into industry changes by hiring or consulting with practitioners. In hospitals, IS departments are starting to employ physicians.

Identify industries operating under similar conditions for guidance in coping with change. Health-care organizations are looking to insurance and government agencies for benchmarks.

Base systems on flexible architectures to cushion the impact of future changes. Health-care CIOs are modularizing systems and isolating fundamental processes from portions that could change substantially.

Be more of an integrator than a developer. Health-care CIOs are proceeding on the assumption that success comes not from having the best system but from having the systems that work best together.

Creating an IS action plan under these circumstances is no easy task. Complicating matters further is the sheer number of IT priorities (see box, Page 42). "Organizations fail because they get overwhelmed by the scale of what they're trying to tackle," observes Terry Neill, Andersen Consulting's worldwide managing partner of change-management services in London. "We advise clients to write a disciplined plan for change management in the same way they would write a plan to build a system."

At Brigham & Women's Hospital, Glaser cut through the murk by drawing a map that tied specific systems initiatives to five drivers of change: the need to reduce costs, increase patient satisfaction, report on care quality, increase interorganizational data sharing and improve operational processes.

"We put the five drivers on one side and system activities on the other and drew lines between them, ending up with a spider web," Glaser says. "Then we identified which activities would impact the most drivers and which would have the greatest impact on any one of the five." It's no magic formula, but anything that helps prioritize options is useful.

Even when IS, senior management and clinicians agree on priorities, anything can change at any time. For that reason, flexibility is at the heart of all new IS development. "We try to be open and agile in our systems architecture so that we can allow for change as rapidly as possible," Glaser says. This strategy also minimizes damage when change makes work in progress obsolete.

> *"We try to be open and agile in our systems architecture so that we can allow for change as rapidly as possible."*
>
> –JOHN GLASER

Most IS chiefs would prefer to bide their time while industry standards gel and federal and state legislation is debated. But escalating competition makes waiting unwise. Hospitals are already competing for corporate subscribers and insurance partners. They are also competing for physician alliances—partly to win patient referrals, partly to field the best clinician roster and partly to guarantee a complete treatment continuum (see box, Page 39).

"My fear is that other CIOs with more-sophisticated integrated systems will use that against us" in competition for physician and provider partners, Briggs says. Even the highest-quality institutions can't stand without partners. "There's no in-betweens here," he continues. "You'll

HEALTH CARE AT A GLANCE

PAST

Independent health-care providers charge by fee-for-service, encouraging high utilization and escalating patient costs. Hospitals compete by building reputations for sophisticated, high-tech treatment facilities in various specialties. Patient medical histories are specific to physicians or institutions.

FUTURE

Regional and community-care networks negotiate with subscriber and insurance groups on set, per-patient fees and assume liability for any excess costs. They compete on their ability to provide highest-quality care at lowest cost. Patient medical histories are shared and consistent across the continuum of health-care providers.

either be a survivor or you won't."

Fortunately, there are some givens that IS can get started on now. Interfacility integration tops the list of IS priorities over the next two years, according to a survey of more than 1,000 IS practitioners attending the annual HIMSS conference last February. The same survey named Ethernet as the technology most likely to be adopted for that purpose. While over half of the respondents said they have already linked their hospitals to doctors' offices, pharmacies and radiology clinics, less than than one-third have connected to outpatient centers, home-care providers or long-term care facilities.

"No matter what happens, there are some things we know we need to do, such as develop the ability to share information with other organizations," says Jim Adams, senior director of information services at the Orlando Regional Healthcare System in Florida. That will mean passing computerized patient records across integrated clinical information systems using electronic data interchange, workflow software, and other communication and group-oriented technologies.

Orlando Regional is assembling a wide area network and EDI system to facilitate data sharing. Application development, previously focused on hospital systems, has broadened to include ambulatory-care sites. "We are trying to get more of our applications and systems out beyond the normal four walls of the hospital," Adams says.

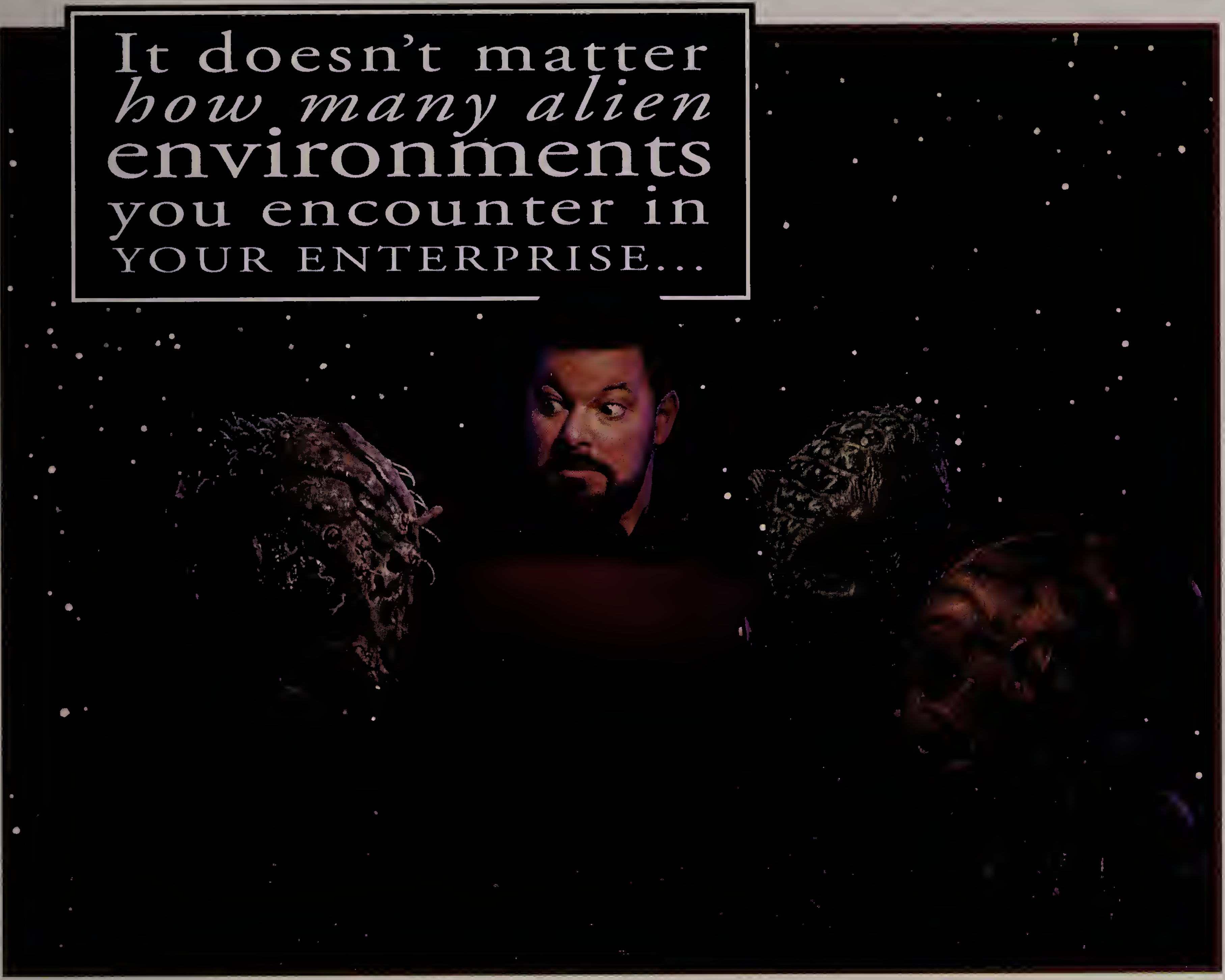
> *"If your IS plans are changing daily in response to the changing landscape, then you're on the right track."*
>
> –GALEN BRIGGS

Geisinger Health Systems, a 48-site patient-care organization based in Danville, Pa., already has the infrastructure to support a continuum-care model in which computerized patient records are shared among inpatient facilities, doctors' offices, nursing homes and so on. Geisinger sites share a common patient basic-demographic database, but IS is building a centralized clinical-data repository that will merge inpatient and outpatient medical histories in a form more suitable for cost-containment and quality analyses.

Geisinger is also developing a physician order-entry expert system that encourages doctors to be cost-conscious when ordering tests and lab procedures for patients. "The system will prompt them to go in certain directions," says CHIME's Reed, who is also CIO and senior vice president for operations at Geisinger.

Epic Healthcare Group, a Dallas-based, 18-state patient-care organization, is offering its systems to off-site physician practices to encourage their patronage of Epic hospitals. "We're bringing physicians systems that will reduce their costs and improve their cash flow," explains Dennis Connor, director of information services. The automation will relieve doctors of administrative burdens and provide conduits for accessing shared computer-based patient records. "You do that and you've got that physician tied into your organization, rather than having him go elsewhere," says Connor.

Even with a handful of givens, it's



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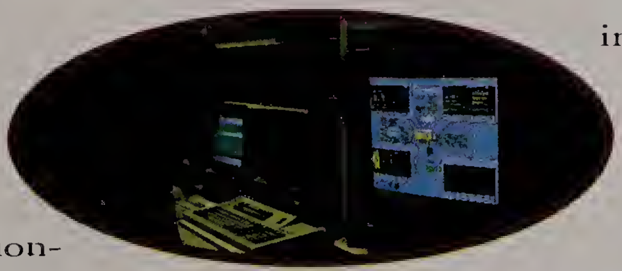

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difficult to know if you're moving in the right direction at the right pace. Health-care CIOs should continually review their work and allow frequent opportunities to adjust to unfolding changes. "We've created a more active steering committee with senior-management involvement, and they continually review our priorities," says Briggs of Sisters of Charity. His rule of thumb: "If your IS plans are changing daily in response to the changing landscape, then you're on the right track."

Health-care providers can also benchmark their IS strategies against various other industries that have weathered dramatic change. Andersen Consulting advises clients to look at industries whose methodologies for managing change might be comparable. "You could look at the other side of the health-care process—the insurance industry," Neill suggests. Because of its regulated, not-for-profit status, health care also bears similarities to some parts of government, such as the Social Security Administration. On a system-specific level, Neill advises IS to modularize systems and isolate fundamental processes that should remain relatively stable from portions that could change substantially.

Still another concern for CIOs is that unresponsive vendors may hobble IS efforts to keep up. "It's not possible for us to develop all these systems ourselves," says Beth Israel's Messier. "Vendors have to come up with product, and it has to work."

Fortunately, many vendors are adopting more-cooperative strategies to meet the challenge. For example, Hewlett-Packard Co., a major health-care hardware supplier, is working more formally with other vendors to develop integratable systems, which are being piloted in large-scale test beds. HP representatives on standards-setting bodies and in Washington and various state capitals are monitoring reform legislation to keep on top of potential systems-related developments.

While CIOs might be stymied by the lack of turnkey systems, many of the key technology pieces are becoming available from diverse sources. Regional Bell operating companies such as Ameritech Corp. are working on network support for communitywide health-information networks. And boutique vendors with analysis expertise have developed risk-management software. For example, Health Payment Review Inc. of Boston sells a program that can analyze a hospital's clinical-practice patterns in order to compare its treatment quality and cost controls with those of other providers. And consultancies and vendors like Hewlett-Packard can provide integration services to make these various products interact.

How will IS as an entity emerge in the new and improved health-care industry? Some expect it will shift its focus from development to integration. "Historically we've been focused on installing applications and not caring as much about the infrastructure," Orlando Regional's Adams says. "Now success will be defined not by having the best clinical systems but the best systems that work together."

For health-care CIOs, the industry upheaval is like a double-edged scalpel. "It's both very exciting and very scary," observes Erica Drazen, vice president and director at consultancy Arthur D. Little Inc. in Cambridge, Mass. IS managers have a new opportunity to make a greater impact on the enterprise. But they must also labor under the threat of greater disaster. "Now it's not simply the system that doesn't work; it's the business that will fail," she says.

The successful IS executives will be those who understand how to manage risk, know when they've made mistakes and adjust early, Drazen notes. "They'll have to cut their losses and run." The unsuccessful IS executives will be those who fail to recognize change, are uncomfortable working with senior management or are content to be data-processing directors. There is no shortage of the latter. Executive recruiter Russell Reynolds Associates Inc., headquartered in New York, has undertaken more IS searches for health-care clients in the last two years than in the previous five combined, according to Austin Broadhurst Jr., managing director of the company.

> *"Now it's not simply the system that doesn't work; it's the business that will fail."*
>
> –ERICA DRAZEN

To be fair, part of the turnover stems from the rash of mergers and resulting CIO redundancy—another aspect of the change besetting this industry. As Beth Israel's Messier puts it, "I don't know tomorrow if we'll be merged with three other organizations, and when they go to consolidate IS groups, whether I end up a winner or a loser."

The year 2000 is staring health-care CIOs in the face, and the task that they see before them is intimidating. But a quick look around should help bolster their spirits and remind IT practitioners why they put up with this turmoil. "When I go into the inpatient areas, I'm reminded that it's the patients who ultimately benefit in this industry," Glaser says. "When I see these people getting taken care of, I know why I'm here." CIO

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HASTE MAKES...
MONEY

BY ANNE STUART

> Companies have always raced to get to market first. But today, speed is a competitive weapon that requires being nimble as well as quick; used wisely, it can turn a company around.

In 1985, when Henry F. Duignan took the reins at Ross Operating Valve Co., designing a new product to meet a client's specifications was a very big deal. "It would have taken us maybe nine months and $600,000 to create a new pneumatic valve for a customer," recalls Duignan, vice president and COO of the $100 million Troy, Mich., manufacturer.

Today, it's a snap. "We can do it in about 24 hours and for about $2,000," Duignan says. And that's not for a rush order; it's simply business as usual. Using computer-aided design (CAD) workstations, the company's engineers can work online with customers to design prototypes—"virtual valves"—literally overnight.

The quick turnaround time has turned Ross around as well. When Duignan came on board, the company was slouching toward bankruptcy. Now, he says, "we're growing at about 500 percent a year." That's largely because Ross retooled its entire organization to operate under a simple, even simplistic, principle: Time is money.

Dozens of other industries and companies are also dusting off that ancient adage as they explore new ways to use time as a competitive weapon. But, like Ross, the top finishers in the race to market don't just run faster; they run better—while remaining poised to switch directions and take on new opportunities.

Or as Boston Consulting Group vice presidents Thomas M. Hout and George Stalk Jr. put it, they run smarter. Hout and Stalk, co-authors of *Competing Against Time*, were most recently featured in a Harvard Business School video, *Time Based Competition* (see "Trendlines," *CIO*, April 15, 1994). In both, they contend that top time-based companies not only deliver faster but offer greater variety, lower cost and higher quality than slower rivals. Their rewards: greater growth and bigger profits.

For IT, the challenge is developing systems that help make contenders not only swift but flexible as well. At the same time, consultants warn, IT alone can't create a champion.

"Technology is inevitably a piece of the solution," says Laurence P. Chait, a director at consultancy Arthur D. Little Inc., in Cambridge, Mass., and a vice president specializing in business-process redesign. But for significant change, he says, "there has to be something from the top that is pressing organizationwide." For instance, "companies will

HENRY DUIGNAN: *"We can produce one of something or 500 of something and be profitably involved."*

PHOTO BY STEVEN BENSEN

be disappointed if they get EDI [electronic data interchange] and don't put changes into organization and process."

Emphasizing speed isn't a new strategy; companies have always raced to get to market first. What's different is the scenery, a business backdrop that keeps shifting to reflect economic, social and technological changes. Roger Nagel, deputy director of the Iacocca Institute and professor of manufacturing systems engineering at Lehigh University in Bethlehem, Pa., cites three major influences: worldwide communications, fast and flexible delivery systems, and the ability to treat each customer as an individual.

Such developments open new paths, but they also keep organizations scrambling to adapt while trying to maintain pace. Cutting-edge contenders don't just cross the finish line first; they're already warming up for the next race. "When you have fast development capability, your innovation possibilities go up," Stalk says.

As James Wetherbe sees it, companies that want to improve cycle time have two options. "One is being able to change directions quickly," says Wetherbe, director of the Federal Express Center for Cycle Time Research at the University of Memphis. "The other is being able to mass-customize." In other words, quickly create a prototype to customer specifications, then manufacture the product in any quantity.

That's what Ross does. "We can produce one of something or 500 of something and be profitably involved," Duignan says.

Every new wave of technology can help companies gain a short-term edge in the race to market. But experts warn that, from the marathon viewpoint, becoming fast and flexible involves more than beating the clock.

"It's about how fast you get onto the same wavelength as your customers," says David Jackson, management consultant for the worldwide organizational development practice at Digital Equipment Corp. in Hampshire, England. "It's about how fast you can translate the infor-

Increasing the Tempo

The process of buying sheet music used to be slow and rife with frustrations, but today IT is helping stores soothe the savage buyer

Jon Monday and Larry Heller thought musicians ought to be able to face the music a lot faster. The entrepreneurs couldn't imagine why it should take longer to buy sheet music for, say, Lennon and McCartney's "In My Life" than it takes to actually play the song.

Monday, president of MusicWriter Inc., a point-of-sale sheet-music distributor based in Los Gatos, Calif., cites two hurdles in the traditional process of buying sheet music. First, simply finding a copy at a music store can be an impossible dream. "There are hundreds of thousands of songs, and the average inventory for the average store is 400 songs," Monday says. And even if a store carries the music for "Look What They've Done To My Song, Ma," chances are good it's in the wrong key.

Songs can be special-ordered from publishers, but that process hits a sour note with both retailers and customers. Because of the narrow margin on sheet music, retailers typically let several customer requests pile up before submitting an order to make better use of employee time. Meanwhile, customers are singing the blues as they wait—sometimes weeks—for music to arrive.

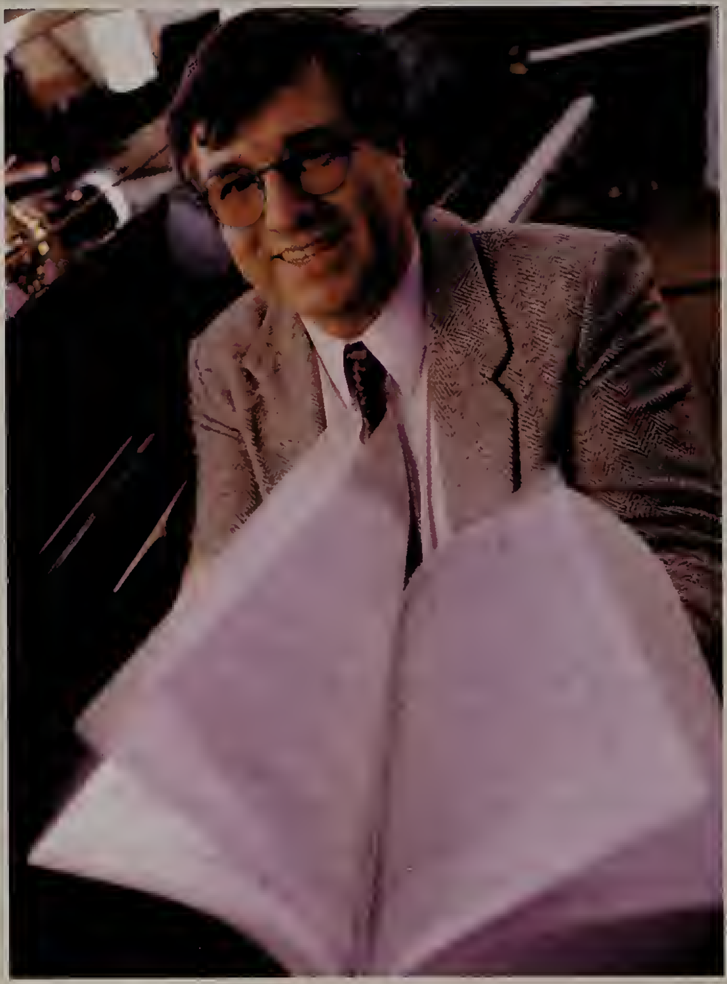
MusicWriter is revolutionizing the process with a store-based system, called NoteStation, that lets customers buy sheet music in minutes. "In My Life" is never out of stock, because it's stored, along with 4,000 other selections, on CD-ROM in the NoteStation kiosk. Customers access the system using a PC-based touch-screen application.

After paying a store clerk, customers pick up their sheet music from NoteStation's laser printer. Bottom line: $3.95, as opposed to the standard retail charge of $3.50.

Choices range from Christian to contemporary, country to classical, and can be ordered in any of 12 keys. Updated CD-ROMs become available every few months. Kiosks are connected by modem to MusicWriter; it tracks sales for marketing, royalties and billing to stores, which receive a percentage of the sale.

Monday says NoteStation earns ovations not only from musicians but from retailers, who save transaction time and storage space. MusicWriter currently runs NoteStations in 175 stores throughout the United States, Canada and the United Kingdom. Plans call for expanding to several hundred more domestic and European outlets this year.

Monday and Heller, who is president of MusicWriter's international division, hope to extend their concept to other point-of-sale applications, believing they can make beautiful music in other industries as well. *–A. Stuart*



JON MONDAY: *MusicWriter is revolutionizing the way people buy music.*

PHOTO BY DAVID POWERS

mation of the customers about what they need, what they want, what they're trying to achieve, and bring that back into your organization, understand it and create something—product, service, support—that will address that need."

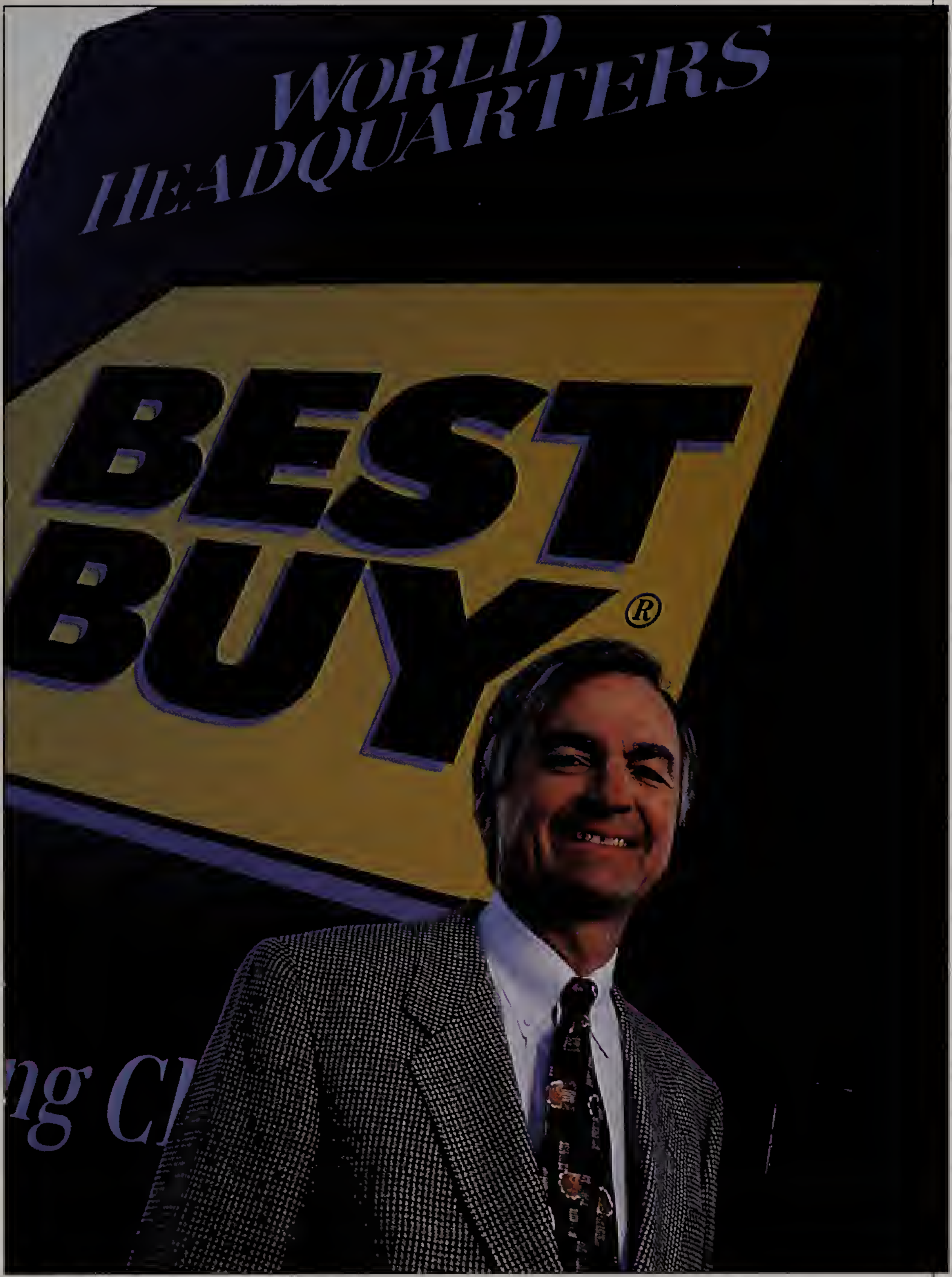
At the 73-year-old valve manufacturer, that happens at the starting line: the design stage. Customers participate in shaping the prototype, building their goals and knowledge into the product.

Cutting-edge contenders don't just cross the finish line first; they're already warming up for the next race.

The relationship, which Duignan describes as partnering rather than serving a customer, also builds loyalty. "You don't have to re-earn that customer," Duignan says. "As long as you keep serving him, he's yours for life."

He acknowledges that the company invested heavily to overhaul and upgrade its operation, including IS. But he adds: "It's the cultural changes that rule, not the technological ones." At its heart, Ross's culture is horizontal. "We did away with hierarchy," Duignan says. "We're an extremely flat organization."

The product-development process works like this: A Ross engineer, known as an "integrator," works primarily with one representative from a customer company. The integrator directs engineering, manufacturing and marketing from a single computer terminal. (Duignan built the staff of integrators by hiring and training young engineering wizards too inexperienced to know they wouldn't normally handle all three functions.) As the product evolves, the customer—monitoring the process online—can make changes with a telephone call.



ALLEN LENZMEIER: *Best Buy eliminated the hard sell and cut sales time in the process.*

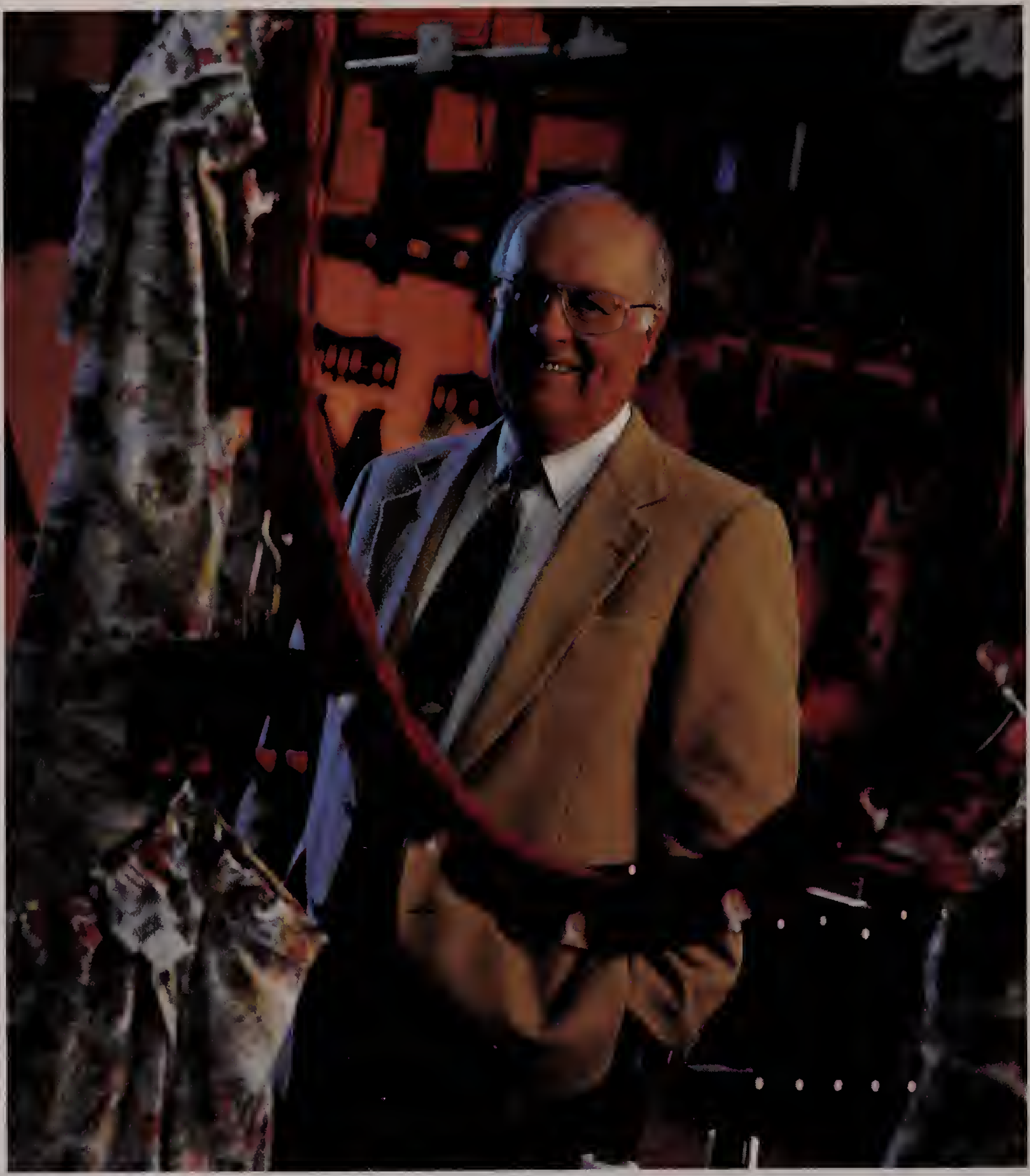
Bill Davidow, co-author of *The Virtual Corporation* (see "A Virtual Visionary," *CIO,* July 1993), says the Ross partnering approach will become more common as companies and suppliers become increasingly dependent on one another. "The wave of the future is for customers to have fewer suppliers and suppliers to have fewer customers," says Davidow.

Meanwhile, other companies have introduced a host of less radical efforts to make themselves nimble and quick.

Many simply streamline, cutting waste early on. Toyota Motor Corp. in Japan sped up assembly lines with "value engineering," a series of tiny timesaving design changes. For instance, the Japanese automaker now cuts sheet metal to precise measurements rather than leaving a narrow margin to trim and finish later.

Some strive for timesaving at the point of sale. Until 1989, Best Buy Co. Inc. of Minneapolis, the nation's second-largest consumer-electronics chain, ran its stores like many of its retail competitors. As Best Buy's CFO Allen Lenzmeier describes it, customers went through a 10-step purchasing process that began when

PHOTO BY PER BREIEHAGEN



JOSEPH OFF: *"There is no idle time. Everybody works as a team."*

they walked into the department and ended when they picked up merchandise. In between, salespeople made presentations, checked computers for available items, pitched extended warranties and filled out paperwork; customers then moved through cashier lanes and, finally, retrieved their purchases at a warehouse window.

Best Buy redesigned stores to put all available items on display. Salespeople now serve as "product specialists," answering questions without making sales. Now customers complete transactions in four steps: enter the store, find the department, select the item and carry it to the cash register. Simple and old-fashioned, but it works.

Primarily, company officials wanted to make shopping more pleasant by eliminating the hard-sell atmosphere. But they discovered that streamlining also cut time, particularly for customers who do their homework before buying. "In today's fast-track world, customers are much better informed," says Best Buy spokeswoman Laurie Bauer. "They come into a store knowing exactly what they want. Now you can walk in, grab it and go."

Lenzmeier credits the approach with fueling the chain's growth from a $28 million company a decade ago to its current pinnacle as a $3 billion powerhouse with 151 superstores in 18 states.

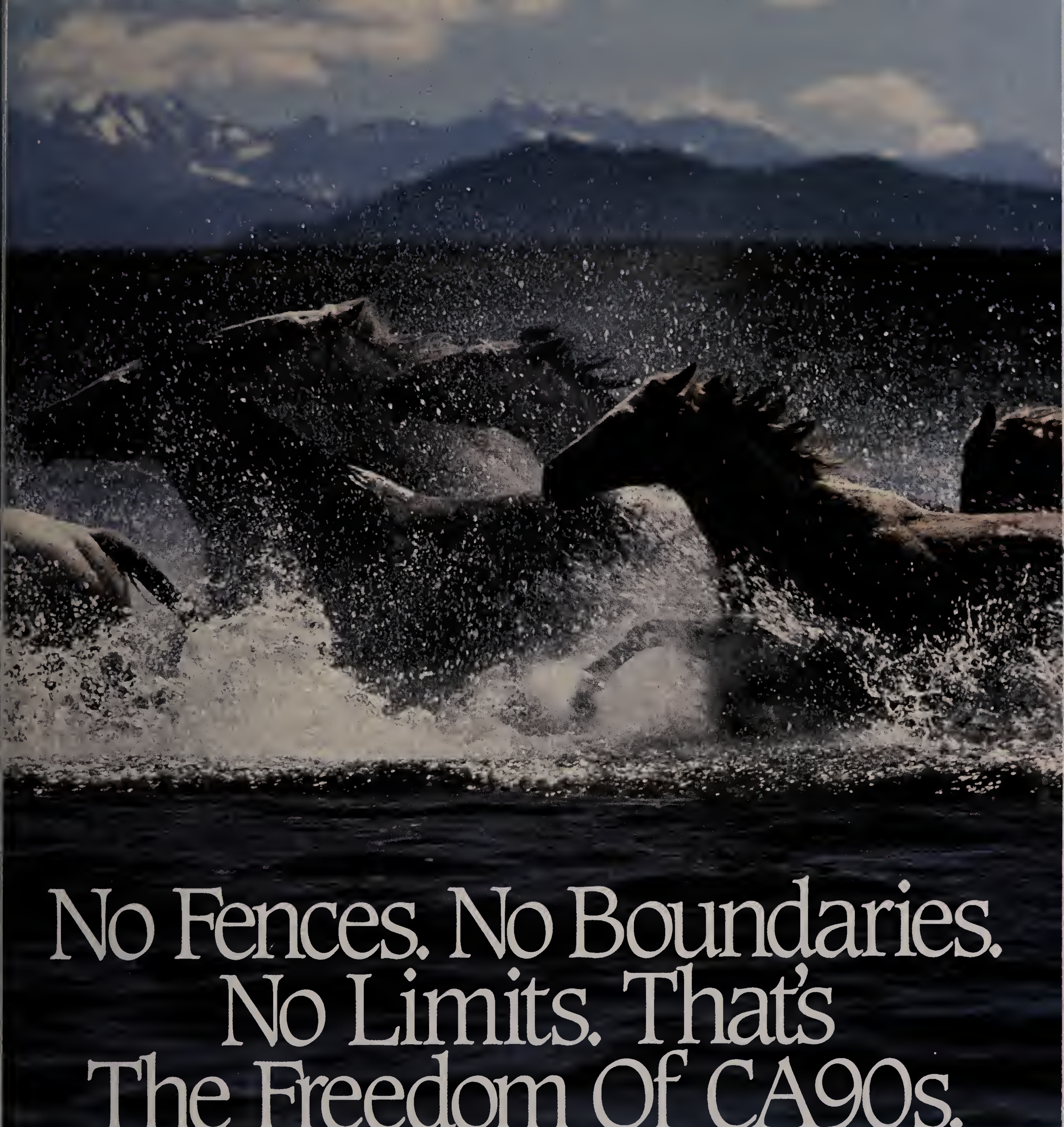
Others, including the textile and apparel industries, are working feverishly to shorten the pipeline. Traditionally, it takes an average of 66 weeks to mass-produce and deliver a garment, says Joseph Off, managing director of Textile/Clothing Technology Corp. in Cary, N.C., a federally funded research group nicknamed TC^2. The long lead time frequently led to costly retail markdowns. But retailers and manufacturers have joined forces to shorten the cycle with point-of-sale information, more-frequent orders and smaller inventories. Industry innovators are also experimenting with printing fabric after cutting, rather than before, and using flexible manufacturing lines staffed by operators cross-trained in multiple functions. "That way, you don't have one person sitting at the machine for hours, doing a repetitive motion," Off says of the latter. "And there is no idle time. Everybody works as a team."

Experts say quality complaints often stem from time-related problems, such as schedule setbacks and outdated information.

Chrysler Corp. also used a team approach to cut product-development time from up to six years to 39 months for its LH line of large cars. The automaker replaced the traditional linear process with teams of several hundred employees and vendors working together, start to finish, in a single facility. Chrysler later streamlined that approach to develop its stylish subcompact Neon car in 31 months.

While customers typically cheer new speed records, they also, understandably, raise questions about quality. Quality focuses on getting the job done right; speed focuses on getting it done first, or at least faster. But the two don't have to be mutually exclusive. Hout and Stalk cite the case of a backlogged Swedish hospital where medical personnel initially resisted timesaving measures proposed to alleviate budget pressures because they feared changes would hurt quality of care. But patients already suffered needlessly, waiting months or years for

PHOTO BY SIMON GRIFFITHS



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surgery. By overhauling scheduling, staffing and preoperative procedures, the hospital cut the wait to weeks—and increased the number of operations per day by 30 percent.

Wetherbe cites studies purporting to show that, in many industries, only 3 to 5 percent of the time needed to complete a job actually involves productive work. The rest disappears into black holes of duplicated effort, misfiring communications, lost information and linear processes where each step depends on the previous one.

In fact, experts say, quality complaints often stem from time-related problems, such as schedule setbacks and outdated information. And some companies that consistently set the pace for speed to market also regularly get high marks for quality; consultants cite in particular Boeing Co., Compaq Computer Corp., Honda Motor Co. and Microsoft Corp.

So why isn't every company fast and flexible? Because the typical organizational structure is just that: "Structured. Rigid. Difficult to break down," says Charles Savage, manager of Digital Equipment Corp.'s organizational development practice in Marlboro, Mass. "It looks logical, but it's fragmented, with little communication or learning. It's set up to check and control, not to listen and facilitate....We are discovering speed because we haven't had it. And we haven't had it because [the organization] hasn't been designed to be speedy; it's been designed to be fixed and solid and continuous."

It may be easier to climb the Hoover Dam than overcome resistance to tinkering with structure. "People get entrenched. They have a way of doing things, and they've convinced themselves it's the only way," says Chait, of Arthur D. Little.

"Anytime you mention the word change, people wonder: 'Will I survive?' " says the Iacocca Institute's Nagel. "Not just, 'Will there be a job for me?' but 'Will I be able to do the job?' "

Front-line customer-service representatives at Federal Express are empowered to handle damage claims up to $100 without seeking higher approval, which means customers get their checks within a day.

Speed depends on empowering employees at every level, Wetherbe says. For instance, front-line customer-service representatives at Federal Express Corp. are empowered to handle damage claims up to $100 without seeking higher approval, which means customers get their checks within a day.

In Nagel's view, companies seeking speed and agility must become more entrepreneurial and adopt the "virtual-company model," creating different structures to handle different opportunities, disbanding them when the project ends. In addition, he says, competitors must market workforce skills, knowledge and experience. "People and information are the only things you have to sell," Nagel says. "Invest in them."

Finally, he says, successful agile organizations anticipate their customers' future needs and try to meet them with customized solutions, rather than just products. The difference? If customers need to rebuild, retool, restructure or retrain to use their new purchases, they've bought a product. If they deploy it easily and profitably, they've bought a solution.

Obviously, IT's role in boosting speed begins with helping information flow more quickly through fewer barriers. But experts say businesses don't need the most powerful architecture on the planet to become flexible and responsive. Instead, they call for installing modular systems or, as Jackson, the British Digital consultant puts it, a "plug-and-play infrastructure," where components can be rearranged as needed.

"It's a shift from looking at IS as a jigsaw [puzzle], where you've got all the pieces, but they [each] only fit in one place, to a Lego model," he says, referring to the toy plastic building blocks that interlock in any number of combinations. Using a modular design, a company can modify one part of its system without having to redesign the whole thing.

And, another consultant says, IT needs to hit the gas itself. "The [current] IT takes too long to develop," says John Donovan, professor of business at MIT and CEO of the Cambridge Technology Group, a consulting firm in Cambridge, Mass. "The entire infrastructure of your IT department has to change its mindset, from positioning as a service to the business side to partners with the business side."

Finally, Donovan says, CIOs must take a hard look at how they view themselves. "CIOs, in general, are managers, dispensers of caution," which slows the process, he says. "Every CIO in the world has to become a leader. Leaders are dispensers of hope."

Recommended Reading

The following are a few sources of further information about the competitive uses of speed:

Competing Against Time, by George Stalk Jr. and Thomas M. Hout (The Free Press, New York, 1990)

The Virtual Corporation, by William H. Davidow and Michael S. Malone (Harper Collins, New York, 1992)

The Machine That Changed The World, by James P. Womack, Daniel T. Jones and Daniel Roos (Rawson Associates, New York, 1990)

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A host of business applications are being infused with new vitality and depth by what has until recently been considered a somewhat frivolous technology set. Multimedia is not just for entertainment anymore.

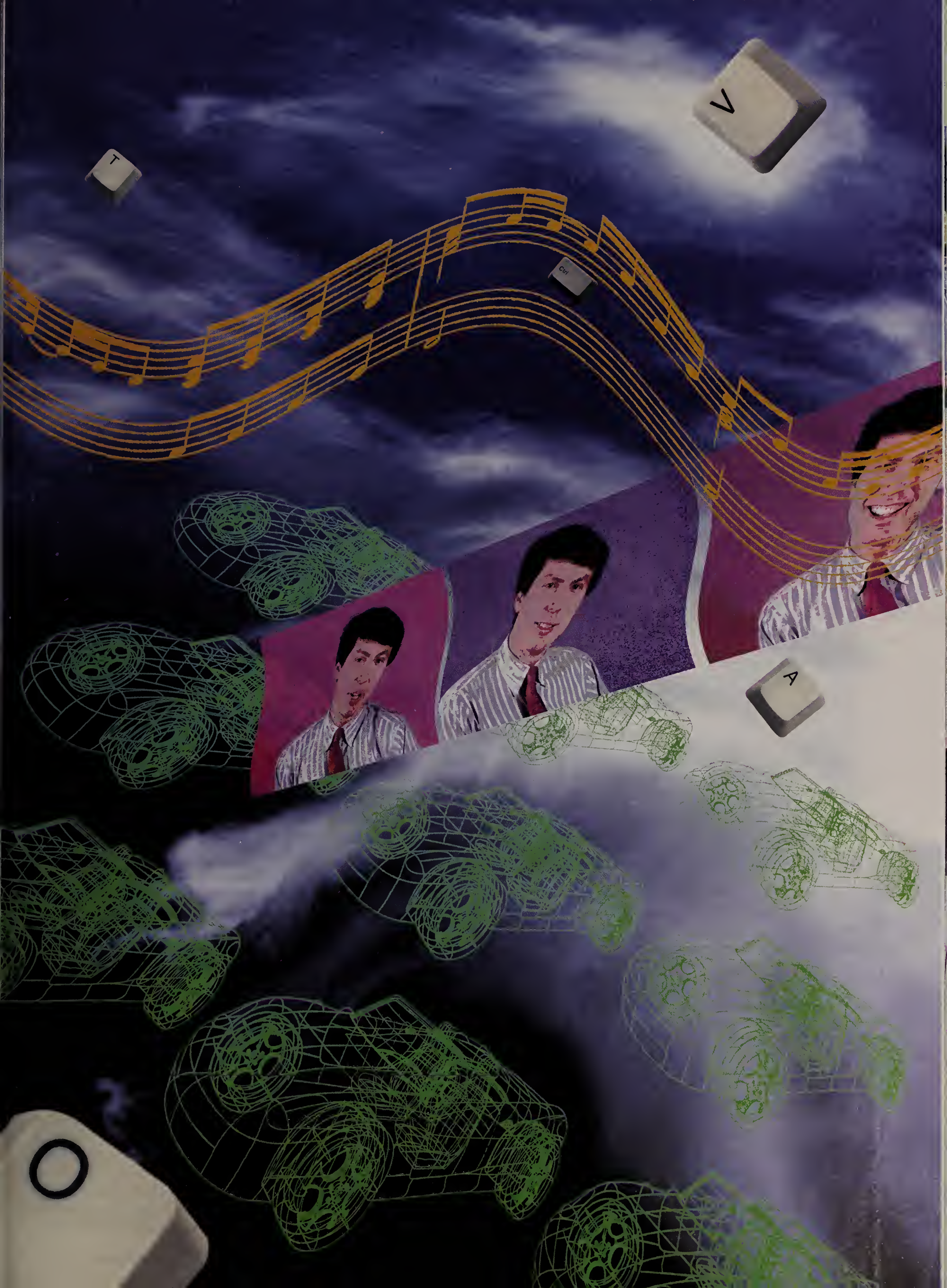
Multimedia *Comes of Age*

BY PETER CASSIDY

Back in the late 1980s, Marriott International Inc.'s human-resources staff was struggling with a problem all too familiar to managers in a contracting economy. Downsizing meant that the department would have fewer campus recruiters to cultivate the rapport with students so vital to landing the best candidates. They decided that at least for the initial contact, multimedia technologies could simulate the richness and responsiveness of a personal encounter. With someone from IS to line up and coordinate the vendors, human resources developed "Explore the World of Marriott," a kiosk system that was installed in placement offices at eight colleges in May 1991.

Inside the enclosed kiosks—equipped with color monitors, keyboards and headsets—students could take multimedia tours of

PHOTO-IMAGING BY STEVE GREENBERG; CAD IMAGES COURTESY OF AUTODESK, INC.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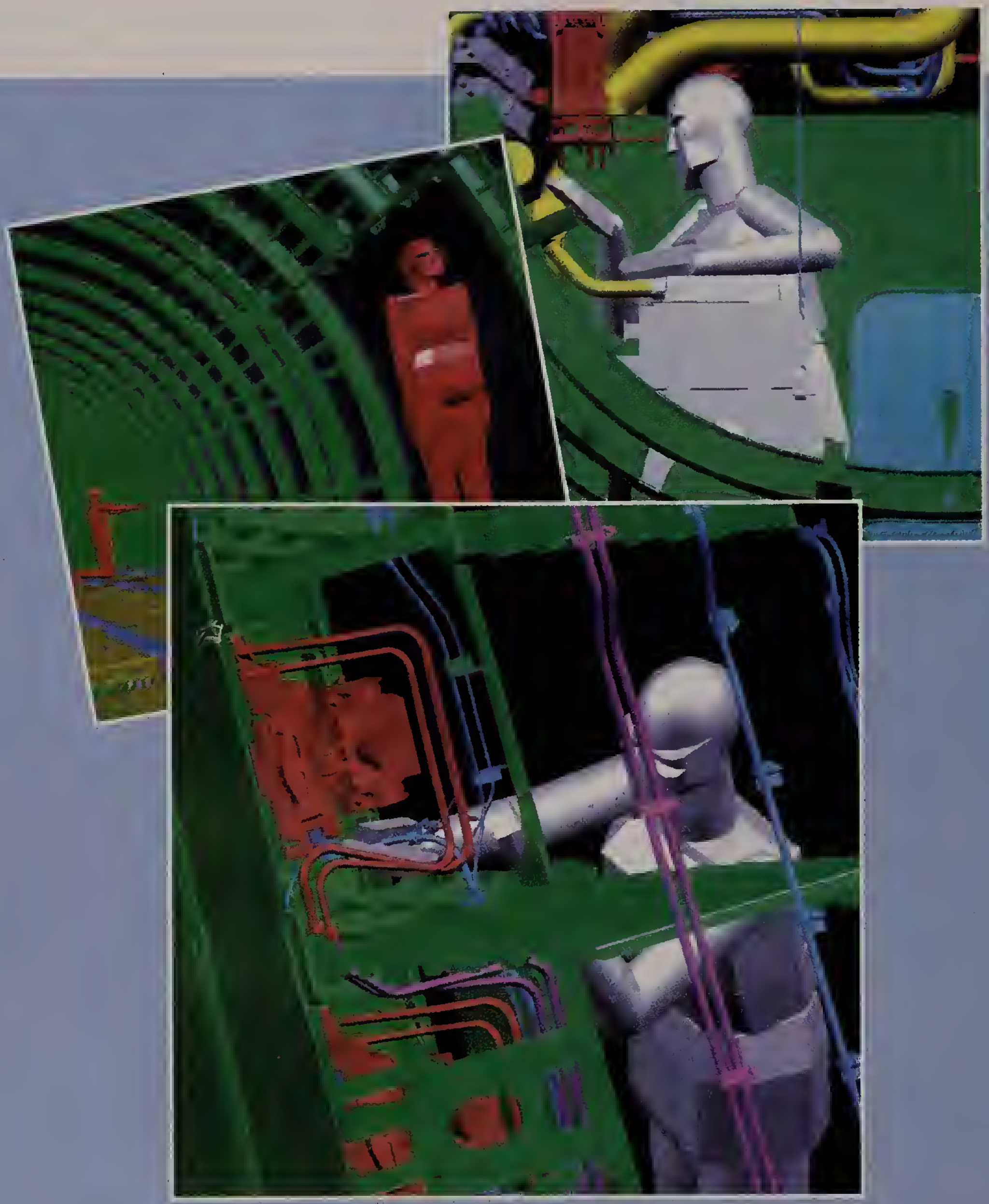


THE BOEING CO.: Engineering Design
The computer-aided, three-dimensional interactive application (CATIA) was developed by Dassault Systemes of France. The application, which can join thousands of workstations, is driven by a cluster of four IBM mainframes. The system is so large and complex that it has its own attending IS group, the engineering computing department.

> **"It's not difficult to use, but it's a paradigm shift.... It's going to take awhile."**
>
> *–Joseph Caspar*

Marriott hotels, review job postings and testimonials of recent hires, respond to a questionnaire about their career interests and key in questions about the Washington-based company. Human-resources staff would download the students' resumes (entered on disk) and the data from the questionnaire, and reply to questions by mail.

The kiosks—essentially Apple Macintoshes with laserdisc players—did a lot of the background work of familiarizing students with Marriott's opportunities and employment requirements. And recruiters arrived on campus knowing each candidate's interests. Instead of delivering a broad pitch, a recruiter could ask for a student by name and, referring to data entered at the kiosk, engage the candidate in an informed discussion.

Marriott's kiosk program was partially suspended last year. Due to additional staff cutbacks, human resources can no longer download students' responses or answer their questions. But the kiosks still allow students to take the interactive tours and ask for information about career paths and employment requirements. And Director of Staffing and Placement Paul Rowson expects that Marriott will eventually reactivate the full kiosk program as part of an aggressive hiring campaign. When that happens, he says, "we'll start a winner."

ENGINEERING DESIGN

Intelligently designed multimedia business applications can be dramatic and effective. Today they are transforming such processes as collaborative product development, training and marketing. Technologically, multimedia is becoming increasingly pervasive. "[It] is an enabling technology that is being absorbed into all other applications," says James Rapinac, principal industry analyst with Daratech Inc. of Cambridge, Mass.

One intriguing application is the use of multimedia in computer-aided design. United Technologies Corp.—parent company of Carrier, Otis Elevator Co., Pratt & Whitney and Sikorsky Aircraft Inc., among others—is developing a multimedia drafting table that spans the globe. The conglomerate has manufacturing and design facilities at numerous locations. But sharing resources and collaborating among them by phone, fax and mail was burdensome.

To solve this problem, the company's research center in East Hartford, Conn., is using IBM PS/2 TV PCs, Person-to-Person/2 conferencing software (also from IBM Corp.) and videoconferencing adapters from PictureTel to put remote engineers into the same virtual workspace to collaborate on design projects. Using the teleconferencing rigs, engineers at different sites discuss design changes and mark up drawings. Photographs are scanned onto the virtual workspace, where they can be annotated by remote conferees. Prototypes of parts are inspected through a camera before they are fabricated for manufacturing.

Joseph Caspar, principal scientist at United Technologies' research center, concedes that engineers will have to overcome some inertia before they start using everything on their desks. "It's not difficult to use, but it's a paradigm shift," he says. "The telephone's been around since 1876, well over 100 years; PCs have been in offices for just 10 years, and videoconferencing just 10 minutes, really. It's going to take awhile."

The benefits of computer-aided collaboration are already proving it is worth the fight to get workers involved. The Boeing Co.'s recently introduced 777, for example, was the first jet airplane to be designed and preassembled on computer screens (see "Virtual Capitalists," *CIO,* June 15, 1992). Previously the Seattle-based company had to build working prototypes to determine such specifics as the best path for a pipe or a wiring harness, according to company spokesman Gregg Hunter.

Using an IBM mainframe-based system, with software provided by Dassault Systemes of France, Boeing assemblies and parts can be designed concurrently by engineers from different disciplines. Engineers can move a model of a human figure into a virtual workspace to see if the assemblies in question are serviceable. The system eliminates one of the greatest costs of airplane manufacturing: trial-and-error reworking.

The industrial virtue that both United Technologies and Boeing are pursuing with telecollaboration is reduction of the time it takes to get their products to market. In the end, "the bottom-line result is that we will develop our products faster," Caspar says.

> **"Most MIS people are control freaks in their heart of hearts....The notion of handing over control to some guy from MTV keeps us awake at night—but it has been successful."**
>
> *–Tom Trainer*

SALES AND MARKETING

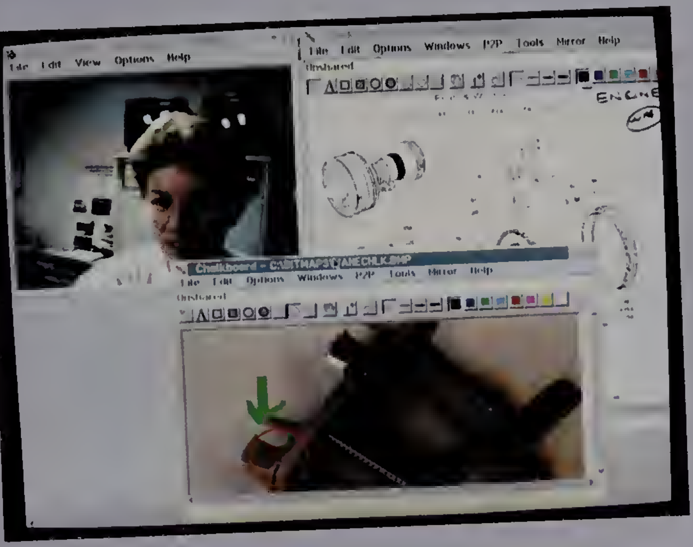
At Reebok International Ltd., based in Stoughton, Mass., sales representatives these days are appearing at retail meetings with athletes in their sales cases. A new requirement of the company's celebrity-endorsement contracts? No; all the airborne basketball players, sky-diving surfers and hyperkinetic types are appearing at these meetings through the magic of multimedia laptop computers.

A group of some 20 U.S.-based sales reps is at the vanguard of an ambitious pilot project to bring the excitement of the company's fall meeting, with its rave-ups of products and sneak previews of commercials, to the desks of retail clients. The project required laptops with stout disk drives, some video and image-compression software, and outboard speakers: all off-the-shelf technology. Managing the introduction of a new marketing model, however, required a change in the traditional posture of IS; it had to get out of the way.

"[After] our first experience with this, I thought software development [was] fairly easy," says Peter W. Burrows, director of systems engineering. "What really became important was the artistic value. What we made looked crude because we stayed too long on a single subject.... All of a sudden, I thought: We need some artistic help." So IS contracted a graduate of the Rhode Island School of Design, whose resume included a stint directing rock-and-roll videos, to produce the multimedia presentations. How does IS manage something like this?

"With great trepidation," says CIO Tom Trainer. "Most MIS people are control freaks in their heart of hearts.... The notion of handing over control to some guy from MTV keeps us awake at night—but it has been successful."

One aspiration IS has for the multimedia marketing project is to put the programming directly into the hands of the sales staff. Burrows is developing an image- and video-clip database that



UNITED TECHNOLOGIES:
Collaborative Engineering

The system uses IBM PS/2 TV computers with built-in video capabilities, IBM's Person-to-Person/2 teleconferencing software and videoconferencing adapters from PictureTel. It enables teams of remote engineers to discuss design changes and ready products for manufacture.

will allow sales reps to prepare customized presentations for the clients they visit, assembling exciting multimedia pitches individually tailored for each client's market segment.

Gauging the success of multimedia projects is tough, Trainer says. "Say you have 500 salesmen in Europe. You want to give each of them a $5,000 PC to use this stuff.... How can you empirically determine that it will link to an increase in sales, [even if sales do rise]?"

At General Media International, publisher of Penthouse, Omni and Longevity, laptop-delivered multimedia sales presentations are an extension of the electronic publications the company delivers through its America Online services. Sales reps negotiating co-development deals for online services can demonstrate some of the online features of their products—such as conferences with famous science-fiction authors.

General Media's content was also programmed by a creative type, a fellow who used to produce television and radio commercials. IS works in an advisory capacity. Requests come from the creative staff for equipment or software, and IS responds.

"I compare this to what happened when PCs first showed up back in the late '70s," says Reebok's Trainer. "We all said, 'Oh my god, how do we control this stuff?'... What we can do is advise the company on how to spend money and provide data, so we're not using 23 different platforms."

In many instances, says Stuart D. Woodring, director of software strategy services with Forrester Research Inc., in Cambridge, Mass., "the new applications are being built out in lines of business by more or less renegade developers—and they are not going through the traditional IT group."

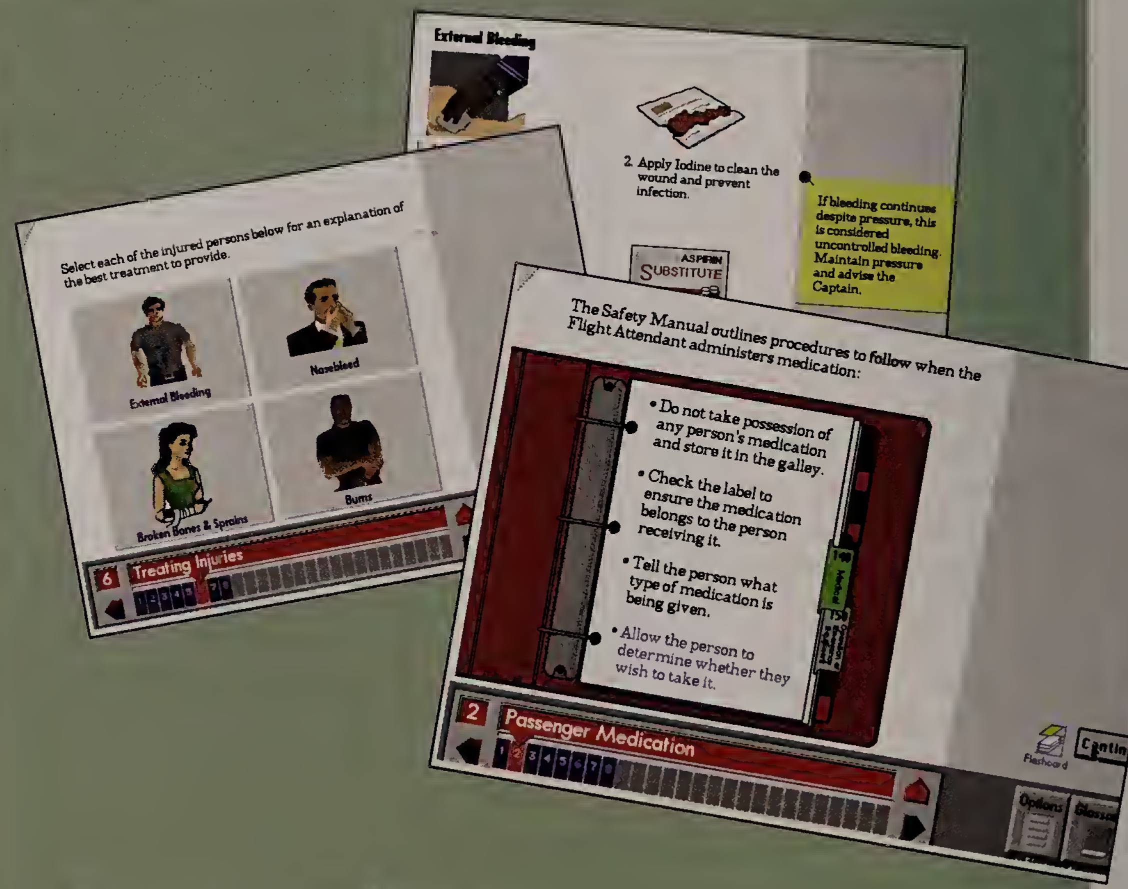
Students at Ford use IBM PS/2 TV computers adapted for analog television. They can call up a word processor and take notes while they view the lecturer and accompanying drawings, graphics and moving simulations.

EDUCATION AND TRAINING

Rapid adaptation to changing business conditions is increasingly key to corporate survival. The capacity to quickly sense and respond to market dynamics—and adopt the attendant new skills to compete—are the requisites for industrial success these days. With traditional training methods falling short, many large corporations are exploring the benefits of computer-mediated, multimedia training environments.

A few years ago, Ford Motor Co., headquartered in Dearborn, Mich., discovered that its engineers were not as knowledgeable in electronics as they should be. With all car manufacturers increasing the use of sophisticated electronic controls in their vehicles, Ford made arrangements with Wayne State University for its engineers to attend classes and receive credits toward a master's degree in electronic computer control systems (ECCS). Ford foots the bill.

Of the 32 semester hours of instruction required for the degree, 16 are delivered through PCs at Ford offices as well as through community cable access that Ford has negotiated with cable companies around Michigan, according to Jerry Steele, Ford's supervisor of instructional methods and research. Wayne State beams the sessions over microwave; Ford picks up the signal and pipes it



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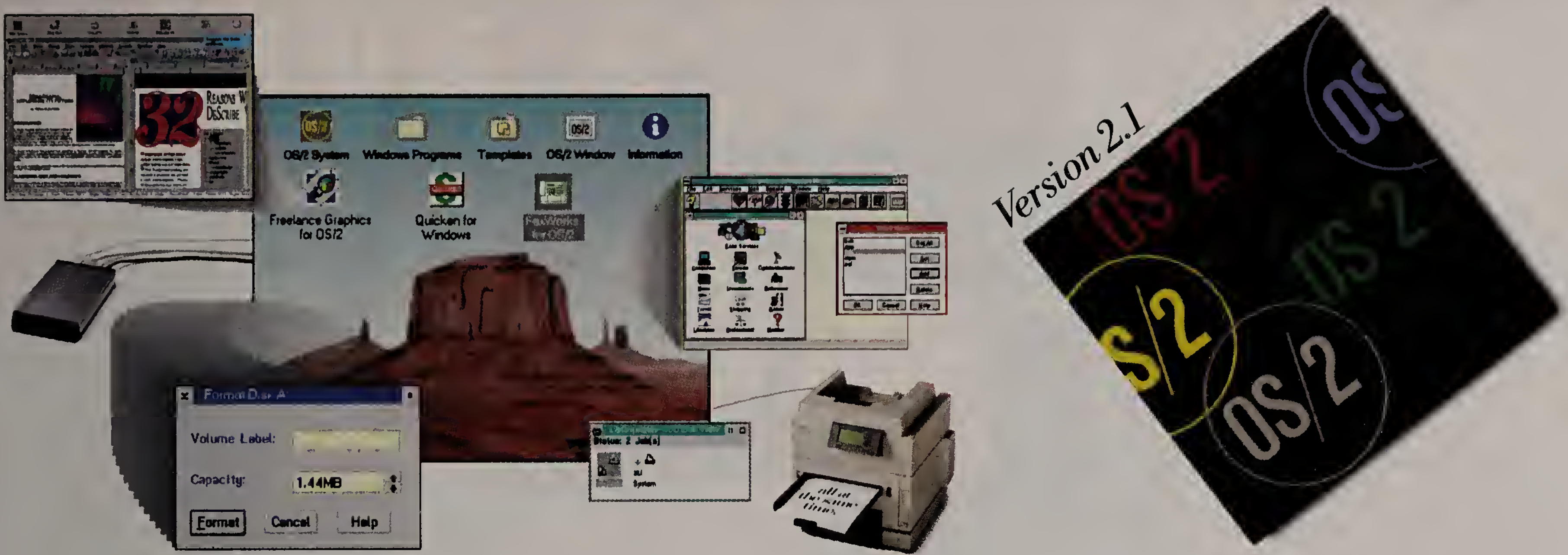
AMERICAN AIRLINES: Training

The Macintosh-based instruction stations present courseware through a set of proprietary World Tutor lesson shells. Course material is written in Authorware Professional by Macromedia Inc. The airline is porting course material to Windows-based platforms to make it accessible to more employees.



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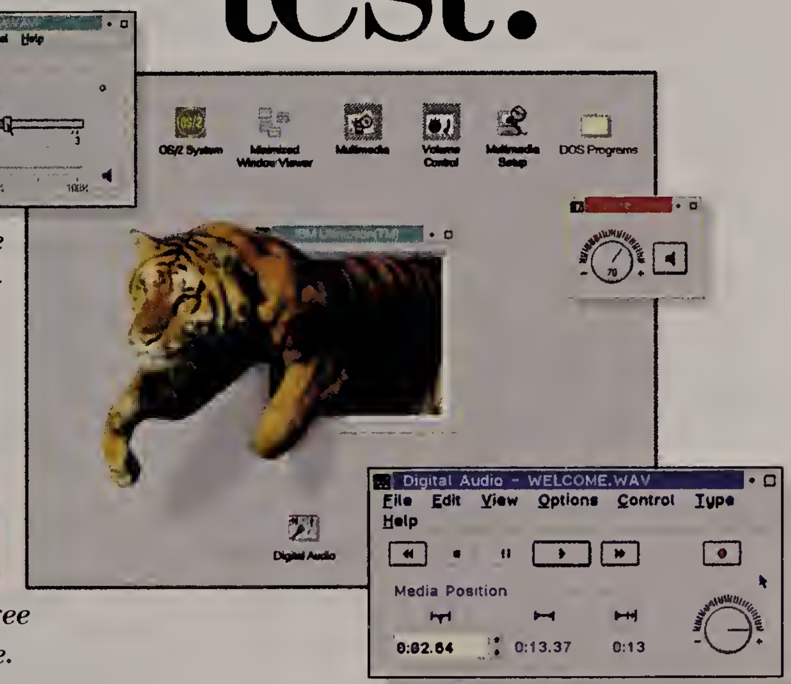

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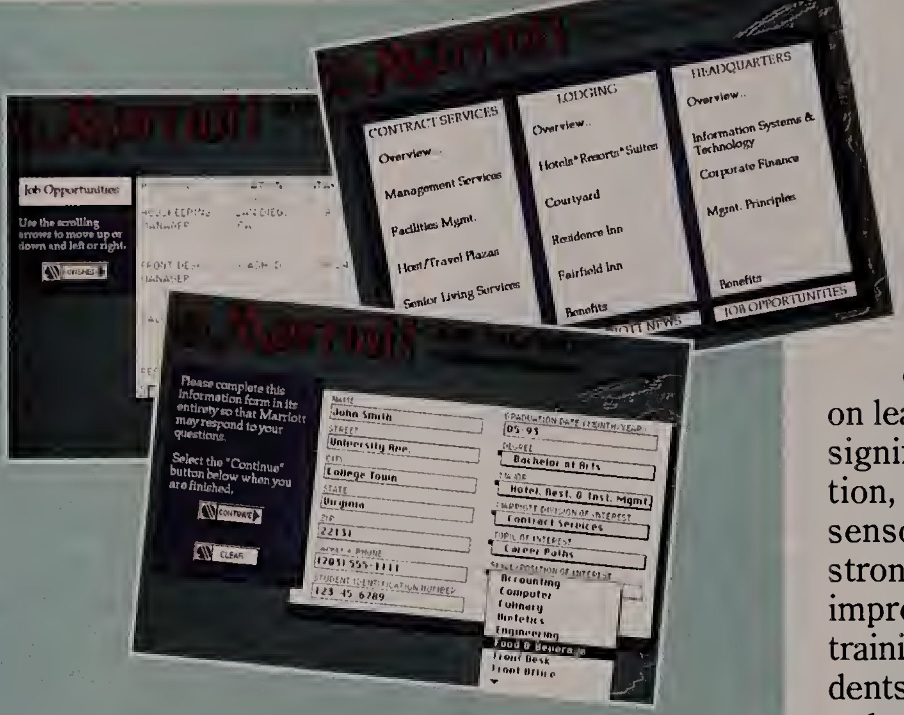

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TOPIC OF INTEREST: Career Paths

MARRIOTT INTERNATIONAL INC.: Recruiting
Prefabricated kiosks equipped with Apple Macintosh computers, a 12-inch laserdisc player and interactive software developed in an early version of Authorware by Macromedia Inc. are installed in career offices and linked to Marriott headquarters by modems and dedicated ISDN lines.

At the Ford offices, students use IBM PS/2 TV computers adapted for analog television. They can call up a word processor and take notes while they view the lecturer and accompanying drawings, graphics and moving simulations. Those working at home can participate in quizzes through their telephone key pads. More students have been served than ever before, Steele says, and their grades have been consistently higher. "I feel students at a distance are advantaged in ways that the ones on campus are not."

Some 250 employees have graduated from the ECCS program in the past two years, and the only plans to change it are to increase the proportion of the course that is offered through multimedia-formatted instruction, Steele says.

American Airlines' employee training contains a strong dose of multimedia as well. At American, ground-passenger service agents perform a wide variety of tasks, such as issuing boarding passes and putting crews on their designated planes. Before they check in their first passenger, however, they must spend four weeks at the company's 540,000-square-foot training center in Fort Worth, Texas.

Much of the instruction is delivered through interactive computer simulations that the students control themselves. The multisensory reinforcement of a lecture combined with text and moving graphics helps students retain the details of the many diverse operations they must perform, according to Robert Blalock, manager of training systems development. In fact, he says, multimedia training increases long-term retention (over a year after training has taken place) by 25 to 50 percent over traditional methods. Less formal studies have shown increases of up to 350 percent.

Multimedia training increases long-term retention (over a year after training has taken place) by 25 to 50 percent over traditional methods.

–Robert Blalock

The training American's international security agents undergo includes participation in multimedia scenarios. The agents engage suspicious passengers in various situations and select their own actions and reactions from a set of options. The video presentation shows the consequences of their choices immediately—a loopback dynamic that has proven its effectiveness in helping students retain what they have learned.

There are three reasons this mode of interactive, hands-on learning produces such significant gains in retention, Blalock says. Multisensory input creates a stronger and more lasting impression; because the training is interactive, students are more directly involved; and instructors freed from presenting the course material can spend up to 50 percent more time with individual students.

It also takes less time to teach the courses that have been adapted to a multimedia format. The course for international security agents previously took 11 days to complete; that has been reduced to eight days, with approximately half of the course devoted to interactive multimedia instruction.

Clearly, multimedia has hit the big time. So what lies ahead? Marriott's Rowson believes his company's kiosks may be doomed to obsolescence by the rapid advances in multimedia technologies and the convergence of television, telephony and computing technologies. "One of the reasons I have not been so forceful in pushing the kiosk forward is that, personally, I believe someday the TV set at home will be the kiosks."

At the same time, the range of applications that can benefit from multimedia will continue to expand, says Daratech's Rapinac. "In 10 years, multimedia won't have any meaning anymore, because it will be everywhere." CIO

Peter Cassidy is a national affairs and technology writer based near Boston. He can be reached by electronic mail at pcassidy@world.std.com.

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For MEMBERS ONLY

In The Research Board, CIOs of large corporations have a forum for discussion of serious issues, a source of information on technologies and trends, and a place to network with the rest of the information elite

There are times when diversity is not desirable. For IS executives of major corporations, those times arise when they are tackling issues peculiar to large institutions, issues that only their counterparts at other mammoth organizations can properly appreciate and advise them on. Fortunately for these singularly challenged CIOs, a unique and somewhat idiosyncratic institution known as The Research Board Inc. makes it easier for like to reach out to like. The Board provides a mechanism for the top IS executives at some 80 of the country's largest, most technology-rich companies to stay in close contact. Meetings, telephone calls and electronic mail enable them to share details about problems and strategies, swap advice, commission joint research and lend emotional support. These days, they seem to need that support more than ever.

"CIOs are taking more risks, and they're doing everything faster," explains Ernest von Simson, senior partner and co-founder of the Board. "It's exhilarating, but it's also stressful." And that's where the Board comes in.

At first glance, The Research Board's home base would appear an unlikely setting for high-powered business interactions. Located in a midtown-Manhattan brownstone, it is distinguished from its upscale residential neighbors only by a small brass plate inscribed with the letters "RB." The offices are referred to as the Board's "house," and, in fact, the decor is very much that of a home. In the comfortably large living room, a table is set for tea, the fire in the fireplace is agreeably smoky, and French windows overlook the sort of garden courtyard for which many New Yorkers would kill. "[Bank of America Vice Chairman] Marty Stein loves that garden," beams Naomi Seligman, The Research Board's other senior partner and founder.

In her own large office, Seligman is happy to point out some of the dozens of framed photographs of Board members lining the walls. In one, a group poses casually on a train; in another, several members ham it up at EuroDisney. "Creating warm relationships is the key to how the Board functions," explains Seligman. But then, as if anxious not to suggest that the Board exists simply to further its members' leisure interests, she adds: "These aren't collegial, shoot-the-breeze get-togethers. We keep things very efficient."

BY DAVID H. FREEDMAN

ILLUSTRATION BY GREG RAGLAND

Seligman's reference is to the thrice-yearly meetings at the core of The Research Board's activities. The ground rules for the meetings were set 23 years ago when the Board was founded with 10 members: No sending substitutes, be discrete, and come prepared. Members still attend meetings themselves, and attendance is generally near 100 percent, says Seligman.

> "LARGE COMPANIES SIMPLY TEND TO HAVE A LOT OF PROBLEMS IN COMMON WITH OTHER LARGE COMPANIES."
>
> *–Naomi Seligman*

The discretion rule, which prohibits passing information gleaned from fellow members to the outside world—and especially to vendors, the press or competitors—is meant to foster frankness. It apparently succeeds: Recently, for example, one member from a financial-services company blurted out to the group that his CEO had chewed him out for failing to provide enough leadership. And as for being prepared, woe to the member who hasn't read the Board-produced report that sets the agenda for each meeting. "Max Hopper always reads it three times, and he comes ready to ask his colleagues some hard questions," says Seligman of the American Airlines senior vice president of IS and chairman of the SABRE technology group.

The makeup of the Board also follows a few straightforward rules. First of all, if you don't head up IS at one of the largest companies in the United States, don't hold your breath waiting for an invitation. (The Research Board also runs a separate organization in Europe.) It's not that CIOs at less-than-huge organizations don't have much to contribute. Few on the Board dispute the notion that smaller companies are in many cases even more innovative in their use of information technology than their mammoth counterparts. The emphasis, however, is less on finding ways to advance the state of the art than on tackling shared problems. "Large companies simply tend to have a lot of problems in common with other large companies," says Seligman. Everyone on the Board represents a company with at least $5 billion in revenues. (The Research Board also runs an "associate" board for "smaller" companies like Corning that don't quite make the $5 billion mark.)

Members come from just about every major industry, one notable exception being computers and communications. To the Board, companies in that industry are simply on the wrong side of the fence—the vendor/user fence, that is. No one wants to risk intimate details of his or her corporate problems resurfacing during a sales pitch (or even worse, during a sales pitch to a competitor). But vendors are often invited to meetings to answer members' questions and make presentations relevant to the discussion. Not surprisingly, such invitations are rarely turned down. The list of companies that sent their CEOs to meetings last year alone reads like a *Who's Who* of the computer industry. IBM Corp. CEO Lou Gerstner came to two meetings, and Microsoft Corp. Chairman Bill Gates visited as well, says Seligman.

If joining this august body is starting to sound attractive, don't get your hopes up. The Board isn't actively hunting for new members, according to Seligman. If anything, the Board has consciously become choosier about whom it admits. For example, when a member retired, the Board used to automatically offer that person's place to his or her successor. No longer; now everyone is scrutinized for their potential to make valuable contributions to the group. Some members have even been asked to resign from the Board because they weren't contributing enough, says Seligman.

The Board is not looking for CIOs who are only interested in preserving the status quo, Seligman explains. "Our membership is becoming younger and more iconoclastic. Half of them [have backgrounds] outside of IT, and many of them are going on to jobs outside of IT."

The new, more dynamic profile of the typical Board member reflects a widespread change in the ways businesses are applying IT, asserts Seligman. "The conventional wisdom is that nobody is really doing competitive-edge systems," she says. "But suddenly it's become pervasive—our members are building applications that are differentiating them in the marketplace." For obvious reasons, Seligman refuses to discuss the details of any of these applications. But she points out that a key element of the new approach is speed. Recently, members have been completing every major system they tackled within eight months of the systems' conception, Seligman says. This is in spite of the fact that approximately 90 percent of these implementations required integrating different areas of the business.

The high-speed, strategic, integrated approach to systems has been inspired by, and has helped inspire, a change in members' attitudes, according to von Simson. "Our members are more focused—they have a stronger sense of mission—than I have ever seen since companies first started applying computers," he says. "Nobody is sure yet what the boundaries are to these new approaches, but they're trying to find out."

One thing von Simson says Board members have discovered the hard way: Don't assume that designing an important new application around a client/server model will make it cutting edge. He notes that one $25 million client/server system is now regarded by the Board as the biggest failure of any system developed by a member in recent memory. By the same token, he adds, several members are working on mainframe-based systems that are as high speed and strategic as they come. "It's not the technology that counts; it's the mind-set," he says. "It's employing self-sufficient development teams that allow IT to partner with users; it's rapid prototyping; it's thorough integration."

The new CIO agenda involves more than simply developing the systems that users demand; members are also helping to determine what their companies need to become more responsive to the marketplace. "Instead of taking orders, IS has become the leader in toppling organizational stovepipes," von Simson says. The increasingly close partnership between IS and other managers can't be described in conventional terms: Von Simson calls it a "striped-line relationship," meaning that it is closer to so-called dotted-line relationships than to conventional hierarchical line relationships.

All this turmoil and attendant risk have left members thirsting for information and perspective, a need that the Board strives to fill. Its most prominent efforts are the three reports the Board issues every year, one before each meeting. Topics are chosen by the members themselves; recent ones have included computer-industry restructuring and IS downsizing trends. The reports are prepared over a nine-month period by a half-dozen or so full-time researchers who canvass members and grill vendors. Out of respect for members' time, the results are boiled down to about 70 pages of double-spaced text—approximately 20 percent of the material gathered.

Ace of Clubs

. . . .

The Research Board reveals the secrets of its success

CIOs at giant corporations typically aren't starving for companionship, addicted to research reports or looking for ways to fill large blocks of open time on their calendars. So, if the New York-based Research Board can boast meeting-attendance rates that approach 100 percent and a slew of requests for other types of interactions from members, it must be doing something right. Here, according to Senior Partner and Co-Founder Naomi Seligman, are some keys to the Board's success:

- The Board creates an atmosphere that emphasizes relationships. By keeping its offices homey and adding lots of personal touches—hanging photographs of members relaxing, for example, and keeping track of which chairs people prefer—The Research Board imbues its meetings with the aura of a family get-together.
- Meetings are productive. Despite the warm atmosphere, once a meeting begins, Seligman keeps it moving briskly and focused on the topic at hand. Members making presentations about new projects, for example, are limited to one overhead foil. "All the members have developed a lot of affection for Naomi," says David Evans, vice president and director of information systems at J.C. Penney Co. Inc., "but she runs a tight ship."
- Frank discussion is encouraged. To make sure members don't hold back in meetings, The Research Board jealously protects the confidentiality of shared information.
- The Board strives to broaden its influence. Though The Research Board's membership is limited to 40 top CIOs and 40 associate members (20 more in Europe), it sponsors a number of ancillary meetings and other activities that bring together, for example, human-resources managers and data-center executives. The Board also fills members' requests to present research and run meetings with other executives at their companies.
- The Board facilitates networking. To encourage members to keep in touch with the Board and with one another outside of meetings, the Board broadcasts a steady stream of E-mail messages that pass on requests for information or keep members up to date on research results.
- Vendor influence is prohibited. Though vendors are sometimes invited to face the music at meetings, their CIOs can't be members, and the Board never accepts any sort of vendor sponsorship.

–D.H. Freedman

Though the reports often tackle complex and nebulous issues, they attempt to focus on the information CIOs need to prepare for the future. The most recent report on technology trends, for example, looks at how wireless communications, combined with the appropriate applications, will free employees from their offices. It also examines the new opportunities interactive television will provide for companies to sell their goods and services directly into consumers' living rooms. Another report spelled out the high—often undocumented—support costs of client/server systems and included members' tips for reducing those costs by as much as 20 percent. "We're not the Gartner Group, providing endless information on products and technologies; nor are we [CSC Index], trotting out inspirational academics," says Seligman. "We've systematically documented what works and what doesn't."

> "IT'S MY POLICY THAT WHEN I'M TOLD ANOTHER MEMBER IS TRYING TO GET AHOLD OF ME, I CALL BACK RIGHT AWAY."
>
> *–David Evans*

The Board also whips up mini-reports on an ad hoc basis for members who request them and will even prepare presentations on various topics for executives at a member's company. To gather high-quality material quickly for these reports, Board researchers frequently broadcast requests for information to all members via electronic mail. Five members responded to a request by Senior Researcher Ann Seligman (Naomi's daughter) for companies willing to test and report on Lotus Development Corp.'s Notes group software. And Senior Researcher James Roche was inundated with tips when he asked for advice about ways to improve the ergonomics of software interfaces. (Some examples: Never use more than five colors; try to keep users from having to press keys with the same finger twice in a row.) The Board also enlists E-mail to distribute mini-reports, case studies and summaries of relevant articles culled from dozens of business magazines.

Members are quick to enthuse about their association with The Research Board. "It's the most valuable outside activity I have," says David Evans, vice president and director of information systems at J.C. Penney Co. Inc. in Dallas. "There isn't even a close second." Evans says the payoff from interacting with members is sometimes psychological: It helps to know that other people have the same problems he has. He also emphasizes the importance of being able to call up other members for impromptu consultations, despite the fact that he and his colleagues are notoriously difficult to reach. "It's my policy that when I'm told another member is trying to get ahold of me, I call back right away," he says. (Indeed, members' secretaries sound as if they are snapping to attention when callers mention The Research Board.)

Dennis Jones, CIO and senior vice president of Federal Express Corp. in Memphis, Tenn., agrees to the value of being able to chat casually with other members. But he also stresses the importance of the Board's more formal activities. He notes, for example, that during one regular meeting, a member related the experience of his company's data center getting knocked out by the World Trade Center bombing. That helped reinforce the necessity of continued heavy investment in backup facilities, despite the fact that with a little luck, the investment will never pay off. And the Board's report on the costs of client/server computing impressed Jones so much that he distributed copies to his company's business planning groups. "From both a professional and personal point of view, the relationships have been of tremendous value," he says.

Perhaps the greatest tribute to The Research Board's success is the fact that, according to Seligman, no one has ever dropped their membership, despite the hefty annual fees (the size of which the Board refuses to disclose) and the deep budget cutting that the highest and mightiest of IS departments have recently endured. "We didn't lose anybody when departments were being downsized by as much as 40 percent," boasts Seligman. "And we're a completely discretionary product." That's one point with which many members might take issue. CIO

David H. Freedman is a freelance writer based in Brookline, Mass., and author of Brainmakers, *published by Simon & Schuster.*

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Keep the Change

Attendees at CIO's most recent conference received a strong message: Their companies' survival into the 21st century will depend on their ability to change both what they do and the way in which they do it

BY JASON S. CASEY

Tom Peters has earned a reputation for being one of the most forward-thinking management consultants. It's somewhat surprising, therefore, that he recommends reading the works of Charles Dickens in order to put the momentous business changes now taking place in their proper historical context. Delivering the keynote address last March at "Re-Visioning IT: Achieving an Enterprise Perspective," the most recent conference sponsored by CIO Publishing, Peters summed up why a novel like *Hard Times*—which chronicles the Industrial Revolution's disruptive impact on English society—is so relevant today. "This is not a period of change but literally a period of revolution. Once every 200 years this happens, where everything is turned upside down."

TOM PETERS *(left) signs his book; conference attendees (above) break for lunch; the Hyatt Regency (below).*

In an environment where speed, efficiency, flexibility and adaptability are increasingly necessary for survival, it's little wonder so many organizations are hard pressed to find new and better ways of doing business, Peters told the audience of nearly 600 CIOs gathered at the Hyatt Regency Grand Cypress in Orlando, Fla. A big part of the problem is that popular concepts such as continuous improvement and business-process reengineering do not go far enough and may even do more harm than good in some situations. "Reengineering is about building new, orderly, sterile organizations to replace old, orderly, sterile organizations," he said.

Succeeding in the '90s will require more than simply changing business processes. Instead, companies will have to learn to abandon everything they now do and constantly reinvent themselves. Leveraging knowledge, empowering employees and creating an atmosphere in which curiosity and downright weirdness thrive will be prerequisites for the successful organization of the future.

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R·O·I·T

EXECUTIVE RETREAT

A VALUABLE RETURN ENGAGEMENT

At *CIO*'s annual Executive Retreat, 100 information executives spent two days attacking the issue of technology ROI from every angle. They emerged with some valuable insights, collegial advice—and plenty to chew over back at the office.

It quickly became clear that the second annual ROI•T (Return On Investment from Technology) Executive Retreat was not going to be about number crunching.

Though the ROI imperative was interwoven with many Retreat topics, the scope of this year's gathering, held Jan. 23-25 in Phoenix, was deeper and broader. Attendees debated with Harvard's James I. Cash Jr. on how information technology should support the knowledge-based organization. They speculated on the future roles of information systems and the CIO. They dissected a real-life IT investment project from American Airlines, with the project's captain, Max Hopper, present to discuss his actions. And there was still time to focus on the partnership between IS and business management during an elegant ceremony honoring six exemplars of ROIT and strategic partnering.

The charismatic Cash, chairman of the MBA program at Harvard Business School and moderator for the Retreat, led off with a thought-provoking discussion of the management paradigm for the future: the knowledge-based organization. Though most in the 100-member audience were veteran IS chiefs, they seemed more like rapt college students as Cash bounded into the crowd, exhorting contributions to the discussion.

THE SUBJECT WAS ROIT: DAVID BYLUND *(l.-r.) and* **NEAL ELGERSMA,** *Hewlett-Packard, chat with* **J. GARTH CLAY,** *Beneficial Life Insurance.*

JOHN SMITH, *Arrow Electronics (l.-r.);* **LESLIE PALMER,** *AT&T Universal Card Services;* **JOHN DICK,** *SynOptics;* **MIKE McGOWAN,** *City of Chicago; and* **DANA NELSON,** *Ascom Timeplex, during a breakout session.*

CINDA HALLMAN, *E.I. DuPont de Nemours, gets some input from (l.-r.)* **GARY REIF,** *GERS Retail;* **FRANK DYKE,** *Fourth Generation Technology;* **DARYL BUERGE,** *CAM-NET;* **JIM RYAN,** *Data General; and* **MARTY SILVERMAN,** *Booz-Allen, during a breakout session.*

BOB TANNER, *Data General, and* **LARAINE RODGERS,** *Xerox, break for high tea.*

PHOTOS BY BOB WILCOX

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The knowledge-based organization, Cash explained, is skilled at creating, acquiring and transferring knowledge, and at modifying its behavior accordingly. It emphasizes three components: mass customization, in which companies granularly examine markets to improve their ability to customize; continuous processes, in which firms continually monitor and assess strategic factors; and the dissolution of organizational barriers, which paves the way for external partnerships.

> **CIOs must do more than simply make data broadly available: They must convert data into information and then into knowledge.**
>
> *–James I. Cash Jr.*

It's up to IS to enable this paradigm, Cash maintained. CIOs must do more than simply make data broadly available: They must convert it into information and then into knowledge. IS must also help the firm to micromarket, support ongoing business-driver monitoring, facilitate internal teamwork and external alliances, and enable reallocation of decision authority.

In the knowledge-based company, IT architecture, information, organizational structure and management-control systems must all be integrated to achieve an effective management process. "That process itself will be a source of sustainable competitive advantage," Cash said. "And for many companies, it will be the only sustainable competitive advantage."

The next topic for discussion—electronic commerce—carried forward the theme of dissolving organizational boundaries. Business transactions across the information highway are increasingly uniting once-discrete organizations, thus creating new challenges for measuring ROIT, according to featured Retreat speaker Hellene Runtagh, president of General Electric Information Services in Rockville, Md.

Through electronic commerce, companies are already forging new relationships with suppliers and customers, as well as slashing inventory costs and product-cycle times. But perhaps more importantly, Runtagh said, they are creating new business opportunities. As an example, she cited a newspaper chain that developed a process to digitize photos for transmission to its printers. That innovation resulted in a spin-off business that sells the service to other newspapers.

The problem, Runtagh said, is that classic ROI methodologies often fail to account for such business opportunities and other soft—but significant—benefits. IT investments are usually green-lighted only if they show a quick productivity payoff. Traditional ROI methods will underestimate the true value of something like electronic commerce, "unless we take a much broader view, and not just measure ROI in terms of productivity payback, but in organizational effectiveness," she concluded.

The shortsightedness of traditional ROI methods was also a theme in the case-study session. That discussion centered on InterAAct, a massive American Airlines (AA) project initiated to provide deskbound employees with uniform desktop productivity tools and connections to other systems. Max Hopper, AA's senior vice president of IS, said senior management approved the project because it felt that unquantified soft benefits (better decisions, faster procedures, more-effective customer service) would more than make up for the substandard hard-dollar returns that were anticipated.

InterAAct quickly hit a series of snags as rollout commenced in 1989. The implementation schedule went awry, and user acceptance was low because of functionality shortcomings. Retreat participants were asked: What went wrong and how would you have handled it in terms of ROIT justification?

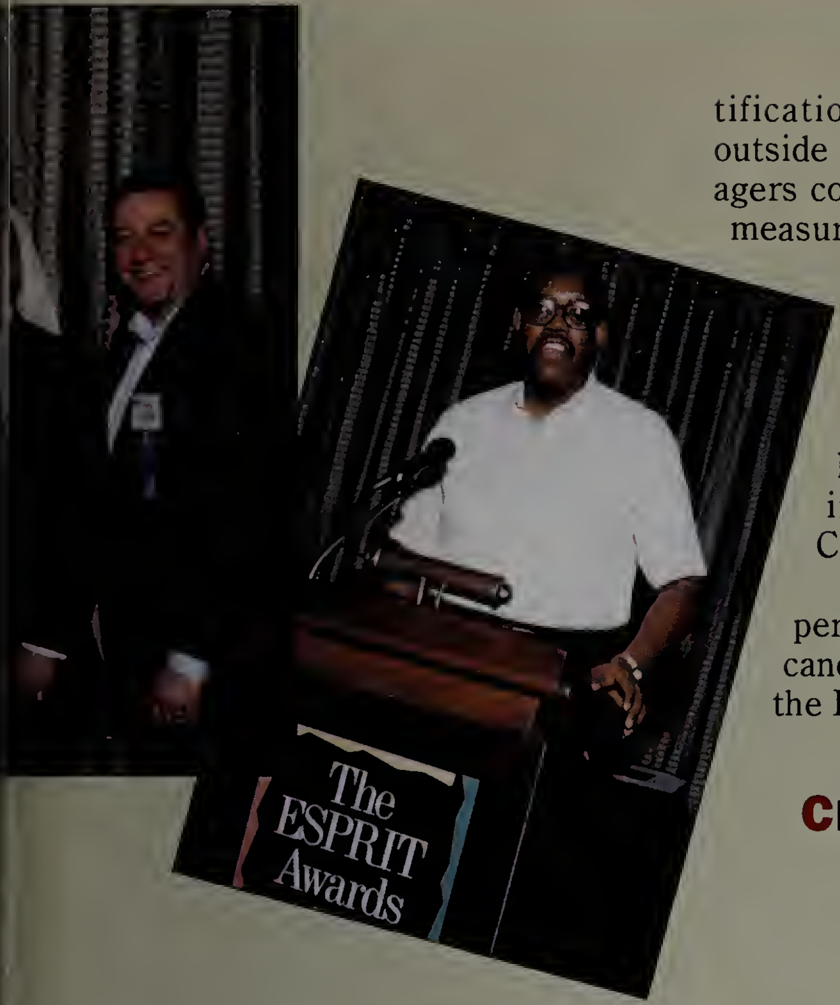
One Retreat participant suggested that user acceptance was low because InterAAct started out as a "technology-push" rather than a "business-pull" project. He argued that there should have been more effort to get line managers' commitment to the system and its intended benefits.

Someone else suggested that AA could have done a better job up front quantifying the ROI of soft benefits rather than simply green-lighting in the faith that they would pay off. Business-unit staff might have been better able to quantify those benefits than IS, he noted.

Another IS executive disagreed: "They are no better at it than we are."

The point was also made that line managers might have been more cooperative in quantifying and committing to the benefits if the timing had been better. When the rollout began, user departments had already invested time and money in their own desktop productivity and communications packages, most of which would be displaced by InterAAct's programs. "You don't force a standard on users after they've invested in something else, or you'll have a tough time of it," said one Retreat participant.

Cash agreed that InterAAct's jus-



COUNTERCLOCKWISE FROM ABOVE:

CIO's **JOE LEVY** *(far left), Harvard Business School's* **JIM CASH** *(center) and* **MARTY SILVERMAN** *(far right) congratulate ESPRIT recipients* **MARCUS NUNES, MIKE McGOWAN** *and* **SAL LATO,** *City of Chicago.*

JIM CASH *introduces the honorees.*

A dinner toast during the ESPRIT Awards ceremony.

tification should have come from outside the IT arena—from managers committed to extracting and measuring the intended benefits.

New measures for success are continually being developed in the business units, and the CIO "doesn't have a chance of keeping up with that shifting measurement base," Cash said.

Later in the program, Hopper took the stage to provide candid, firsthand feedback on the InterAAct case. "It was extremely hard to measure ROI," he admitted. AA wound up putting that onus on individual user departments—the people closest to the customer—to determine whether InterAAct was worth their investment.

Hopper also acknowledged that IS underestimated how difficult it would be to create change in the user organization. Pilot projects should have been longer, he now believes. And InterAAct training, often passed up by users when it was optional, became mandatory for departments choosing to implement the system.

On the whole, the system has done its job, Hopper said. Use of the electronic-mail applications is high; use of the links to central computer systems is lower. Users' satisfaction ratings are running in the middle to higher end of the scale, he added.

Hopper left attendees with the advice that justification depends on team effort, including business-unit and senior-management commitment. "Where we fail is in not having those commitments," he stated.

MELODIE MAYBERRY-STEWART, *St. Thomas Hospital (l.-r.);* **PATRICIA BRYANT ESQ.,** *City of Chicago; and* **LISA NUNEZ,** *L.A. County Department of Public Social Services, at lunch.*

> **Classic ROI methodologies often fail to account for new business opportunities and other soft—but significant—benefits.**
>
> *–Hellene Runtagh*

Retreat participants took time before dinner to meet the Retreat partners, Ascom Timeplex, Booz-Allen & Hamilton, Computer Associates International Inc., Data General Corp. and Hewlett-Packard Co. The poolside management exchanges over "high-tea," with Phoenix's Camelback and Squaw Peak hills serving as sunset-soaked backdrops, focused on IT management trends, industry concerns and ROIT issues.

The Retreat's ESPRIT Awards dinner and ceremony brought face to face the distinguished ESPRIT judges and the practitioners for whom they voted. Marty Silverman, vice president at Booz-Allen & Hamilton, which sponsored the awards with *CIO* Magazine, explained the judging criteria. Honorees are rewarded for outstanding, measurable business success that derives from productive alliances between IS and business leadership. (ESPRIT stands for Excellence in Strategic Partnering for Return from Information Technology.)

ESPRIT judge Donald Lasher, president of information services at USAA insurance in San Antonio, Texas, said he was happy with the choice of honorees, whom judges selected after combing through stacks of application material and measuring the submissions against established criteria. Another judge, Sirkka Jarvenpaa of the University of Texas, Austin, said she was surprised and pleased to see three public-sector organizations among the recipients, since these agencies often have fewer resources to devote to IT innovation.

Attendees spent the bulk of one Retreat afternoon in workgroup sessions, discussing the case study and debating

JOE SEXTON, *Computer Associates (left) and* **DON LASHER,** *USAA, discuss management trends.*

the future role and responsibilities of information systems and the IS executive. With participants broken up into teams of 10 members each, the sessions produced some lively debate.

Each group later reported the results of its discussions to the general session. One concluded that the position of the CIO would continue to exist, but with an altered emphasis. The group described the future CIO as a teacher of top executives, a manager of intercompany partnerships and a scout for organizational best practices. The consensus was that CIOs will continue to manage the technology portfolio, with increased input from user management.

Another group determined that reengineering leadership should be the responsibility of line management. Nevertheless, one of the IS executive's primary duties will be to introduce change to the enterprise, the group maintained.

Determining ROIT is a user responsibility as well, another group concluded. But the CIO must ensure that users have the proper measures in place before approving any IT investments. Those measures must be able to transfer every IT benefit and byproduct to the bottom line, including soft benefits.

The Retreat wrapped up with some inspired advice on how to stimulate creative, "out-of-the-box" thinking in the organization and in the home, courtesy of Mike Vance, chairman of Creative Thinking Association of America. Vance, who cultivates the persona of a cheerful gnome, has built his base of expertise by helping companies reinvent themselves through creative thinking. He can boast of successful professional associations with GE's Jack Welch, computer industry visionary Steve Jobs, the theme park imagineers of Walt Disney, and engineer and philosopher R. Buckminster Fuller, among others.

Heading back to colder climes, Retreat participants were energized by their interactions with Cash and with one another. They were particularly enthusiastic about Cash's insights and moderating performance (some said he alone was worth the trip). Others enjoyed the opportunity to concentrate on a single real-life case study and to break into small groups to confer on important common issues. Attendees most frequently remarked on the value of meeting and sharing views with their peers in a more intimate setting than most IT meetings. Said one attendee: "It's really valuable to hear some of the same things that I'm thinking and doing about these issues coming from the other people here. I'm not alone in this."

Honorees are rewarded for outstanding, measurable business success that derives from productive alliances between IS and business leadership.

Two Sides to Everything

Just because CIOs share many of the same issues doesn't mean they share the same approach to them. Retreat attendees offered a host of conflicting views of the CIO role during one lively breakout debate.

ON THE CIO'S CONVERSANCE WITH TECHNOLOGY:

"CIOs won't need knowledge of technology in the future; they will be brokers or account executives."

"I disagree. They will always require some knowledge of technology."

ON CIO PRIORITIES:

"I see the ability to analyze data as the biggest thing we can contribute."

"Bigger than that will be the architecture. That's where the innovation will reside in the future."

ON LEADERSHIP IN OPERATIONAL DECISION MAKING:

"I can't imagine a successful company where the CIO instigates things; it has to be the owners of the business who do that."

"The CIO has to be at the front of the parade if IS owns the enabling processes."

ON THE FUTURE OF THE CIO POSITION:

"The CIO role will still exist, but the head of technology may not have the same level of importance as the function becomes more of a utility."

"The CIO has to continue to be the focal point."

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"The only way we as a nation will maintain our competitive advantage is to be more innovative than everywhere else," he said. Innovation is hindered by hierarchical structures, and Peters was characteristically unsparing toward companies that adopt total quality management (TQM) while clinging to traditional management practices. "It's sickly and immoral to talk about world-class quality in an organization that has seven layers of management," he asserted.

One of the executives Peters most admires is Hal Rosenbluth, who exudes the kind of weirdness and innovative bent demanded by today's business environment. Under his direction, Philadelphia-based travel agency Rosenbluth International has grown from bookings of several million dollars to $1.5 billion. Rosenbluth spoke with moderator Robert J. Benson about how to create a comfortable "kitchen table" feel to a company, since he thinks that relaxed, happy employees will give the most to their work.

Rosenbluth said he realized his company needed a new CIO when he walked by the IS group one day and heard no laughter. "You can't delegate emotion," he said. "When people care, the ideas start to come." He periodically sends out paper and crayons to employees and asks them to draw pictures about how they feel about work. "You find out things that you would miss through normal communications," he said.

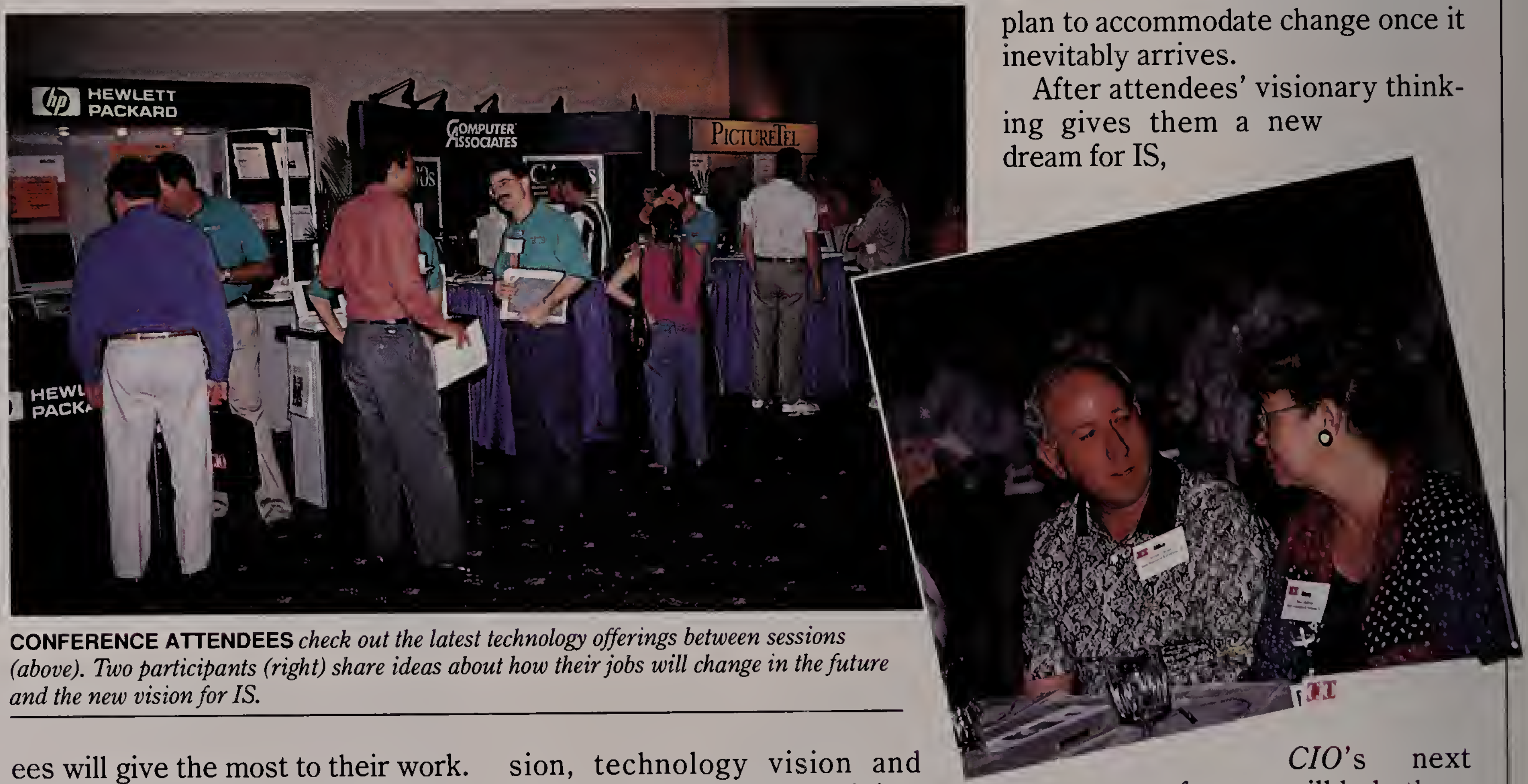
Leveraging knowledge, empowering employees and creating an atmosphere in which curiosity and downright weirdness thrive will be prerequisites for the successful organization of the future.

Rosenbluth personifies the "vision thing" that Benson discussed in his opening remarks. Benson, associate vice chancellor of computing and communications and professor of information management at Washington University in St. Louis, divides the enterprise perspective into three building blocks: business vision, technology vision and change-management vision. "It is the CIO's responsibility to cause these visions to occur, to communicate them and to orchestrate the change management to realize the end goal," he said.

Conference attendees heard firsthand accounts of vision building from several colleagues. Charles H. Mayer, managing director and CIO of CS First Boston, explained that in order to detect where success lies, companies need to establish their strategy first and then implement technology to support it. If you try to do both at once, he said, "it's like building a doghouse over a moving dog." Management at CS First Boston first reengineered its organization to focus on product lines rather than geographic regions. Then the company began migrating its applications from the mainframe to a client/server architecture. It is taking applications off the mainframe one at a time rather than all at once, but "the secret is just to do it," Mayer said.

According to Chuck Musciano, staff software engineer at Harris Corp., a $3.5 billion diversified electronics and communications company in Melbourne, Fla., planning a client/server environment requires the reinvention of IS. "Every decision you make will be obsolete in two years," he said, adding that the best advice he could offer was to plan to accommodate change once it inevitably arrives.

After attendees' visionary thinking gives them a new dream for IS, *CIO*'s next conference will help them ground their vision in fiscal reality. The conference, which will be held Oct. 23-26 at La Paloma in Tucson, Ariz., is entitled, "IT Economics: Business Value & Profit Maximization." Peter Drucker is the scheduled keynote speaker.



CONFERENCE ATTENDEES *check out the latest technology offerings between sessions (above). Two participants (right) share ideas about how their jobs will change in the future and the new vision for IS.*

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FYI

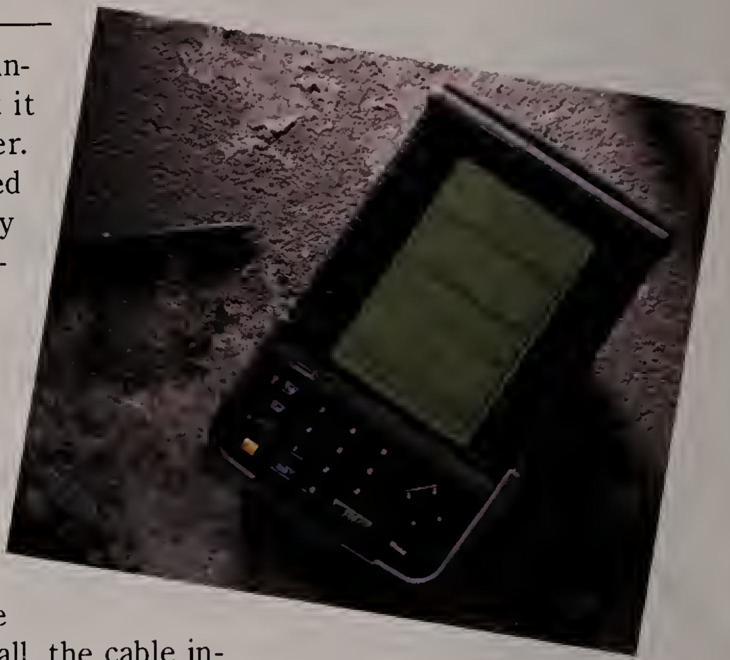
Movers and Shakers

While notebook computers can make business trips easier to bear, there are a couple of caveats to working with them. Some users lament that notebooks are not powerful enough, while others weary of slinging an extra 7 pounds of luggage over their shoulders.

Compaq Computer Corp. has new additions at both ends of its notebook family designed to address these issues. For the power monger, there's a family of performance notebooks, the LTE Elites. The new high-performance machines feature built-in AC adapters and trackballs and weigh under 7 pounds. Powered by Intel Corp. chips ranging from the DX2 40MHz to the forthcoming DX4 100MHz processor, they have removable hard drives with capacities from 170MB to 510MB, from 4MB to 24MB of RAM and PCMCIA slots. These notebooks are powerful enough to use on the desktop, and Compaq has a docking unit that enables that. List prices range from $3,200 to $5,900.

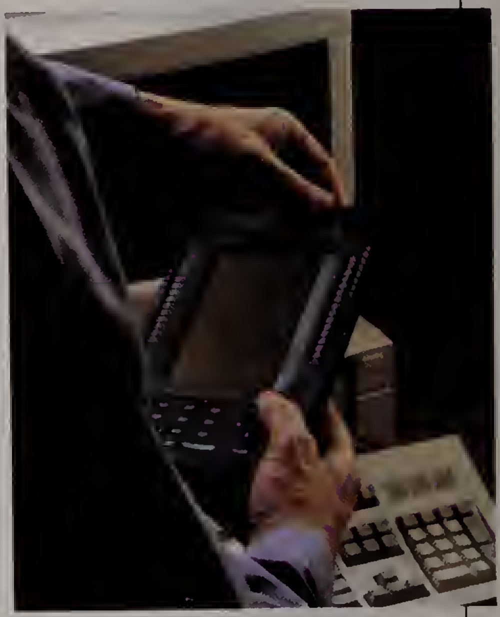
If it's less weight you want, the new Compaq Contura Aero subnotebooks weigh only 3.5 pounds. The 486-based machines are no slouches, with 84MB to 250MB hard drives and 4MB to 12MB of RAM. The monochrome 4/25 starts at $1,399 and the color 4/33C at $2,199. For more information, call 713 370-0670.

Touch and Go



It may not get the cable-television installer to your home on time, but it does make his job a little easier. Norand Corp.'s Pen*Key pen-based computer features three data-entry options, making it ideal for applications that use check-off boxes, screen navigation and scrolling.

The product is aimed at such operations as package delivery, sales automation and other service applications, according to the company, which cites its intuitive ease of use. For example, if you decide you do want to sign up for one of the proffered premium channels after all, the cable installer can use either a stylus or his fingertip on the Pen*Key's touch screen, or strike the "yes" key on the system's 21-key key pad.



The 386-based system features a 320- x 480-pixel screen. It can be programmed to capture signatures, and it can be equipped with integrated laser scanning for reading bar codes. It also connects to an AT-compatible keyboard for desktop use.

Users can add 2MB, 4MB and 8MB memory expansions to the system's standard 4MB RAM. In addition, Pen*Key slots can accept two PCMCIA Type 2 cards or one Type 3 card. The product operates on MS-DOS and supports Microsoft Windows for Pen and Power Pen Pal. A power-management system that features 3.3-volt operation and a 2.5-hour recharge capability allows the system to operate eight to 10 hours without recharging. Prices range from $2,500 to $3,500.

For information, call 800 452-2757.

End Users Help Themselves

Everyone would like to provide support quickly and efficiently to their internal and external customers. Expert Advisor, a help-desk automation system, is designed to do just that.

The software, by Software Artistry Inc., matches patterns in a common database to come up with answers to simple problems. For more-complex problems, end users can access graphics, animation, voice and video for illustrations and descriptions of more-detailed solutions. The software maximizes productivity by having an automated system offer companywide support. Expert Advisor operates on all major local area networks and supports several relational-database managers, including Oracle, Sybase, Microsoft SQL and DB2/6000. For a typical configuration comprising 10 workstations, the help-desk software costs $65,000. Mainframe applications can also connect to Expert Advisor.

A new version of Expert Advisor allows end users to receive solutions without any human interference. With bidirectional E-mail, users send E-mail messages to the help desk and, if a solution is found, Expert Advisor automatically sends the message back to the user. The feature, called The Help Is In The Mail, is scheduled to begin shipping June 15. For more information, call 317 876-3042 or 800 795-1993.

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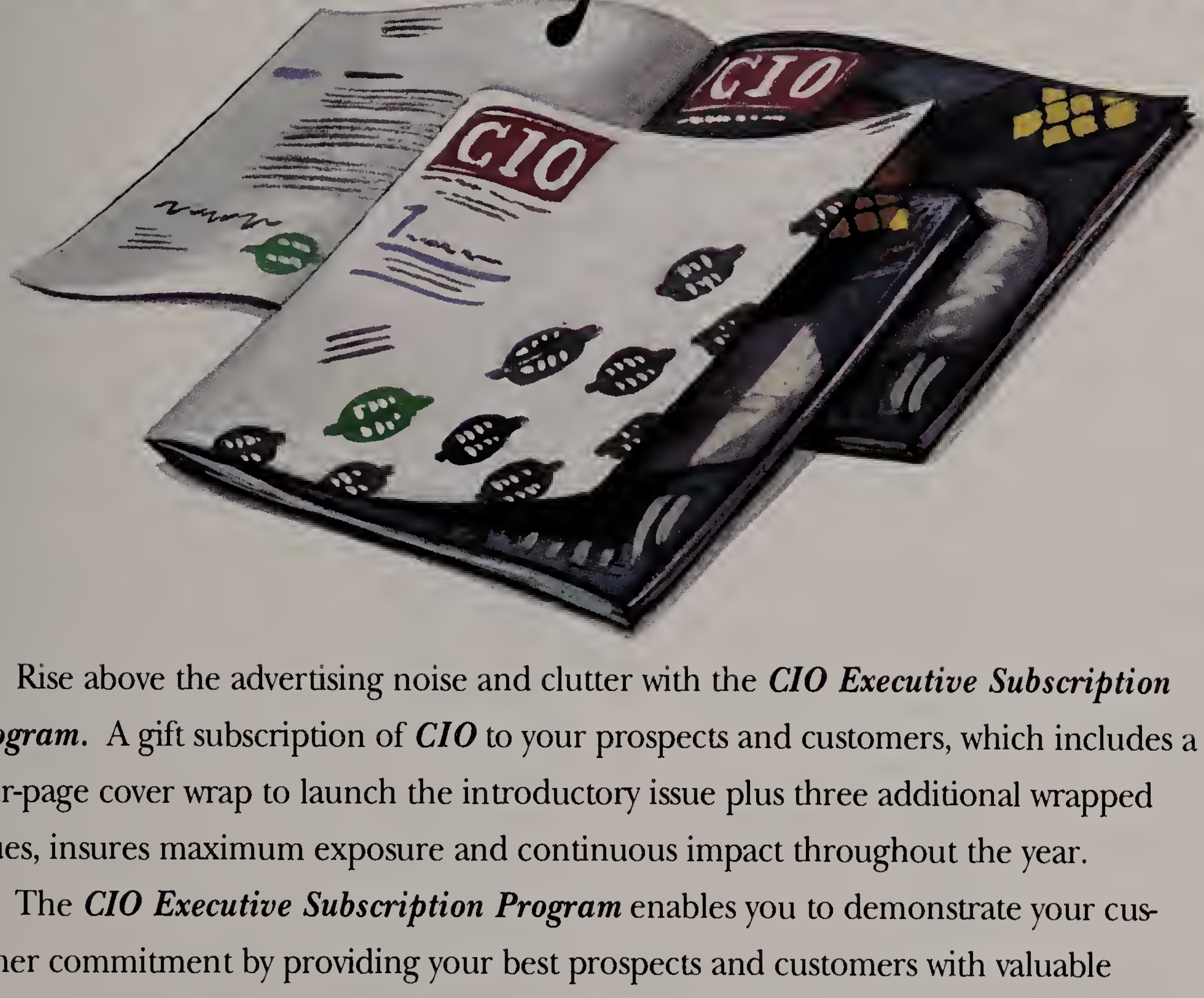

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Fax on the Tracks

With enterprisewide faxing, Southern Pacific's internal and external communications are more powerful than a locomotive

Imagine you are in the railroad business. You haul coal, petrochemicals, wood products, foodstuffs and other freight 24 hours a day, seven days a week, over 15,000 miles of track in 15 states. One of your rail cars is about to deliver 100 tons of coal to a customer. Unfortunately, the customer isn't expecting the delivery, because the fax you sent never made it to their office. Who pays? You do—both in customer goodwill and in the cost of hauling the goods back until another delivery can be arranged.

Fax plays a critical role in many railroads' dealings with customers and vendors not equipped with electronic data interchange (EDI) systems. At San Francisco-based Southern Pacific Rail Corp., the sixth-largest railroad in the United States, roughly 50 percent of purchase orders and much of the company's internal communications are sent this way. Until early 1993, the railroad relied upon a third-party fax service. But the service lacked several important features, such as guaranteed immediate delivery, automatic archiving and sender notification of the status of faxes sent. As the company's fax volume grew, it became clear that something had to be done.

Under the old system, 25,000 documents per month were sent electronically to the service, along with a list of the fax numbers to which they were to be sent. Documents were not always delivered immediately. While priority service was available, it would add to the more than $400,000 a year SP was already spending. Notification of transmission problems was "very nondescript; they did not tell you what the problem was," says Jon H. Larson, business systems consultant for SP. (Larson, previously an SP employee, now works for Integrated Systems Solutions Corp., with SP as his primary customer.) Since SP was faxing many time-critical documents, including delivery notifications and the "track bulletins" that coordinate the movement of trains, that spelled trouble. "In many cases we have a train in the yard ready to go, with the crew and engine sitting there idling and burning fuel," says Larson. "If these bulletins are delayed, it gets very expensive."

As part of a total quality management effort, SP implemented in early 1993 a mainframe-connected fax system that would allow it to eliminate the outside service and fax standardized reports automatically. The system, called PowerFax-I, enables the company to prioritize faxes to ensure immediate delivery of the most critical. Senders are notified of transmission problems, and a confirmed copy of every fax sent is stored in the hard-disk archival system. By August, PowerFax-I was handling more than 50,000 faxes per month; today, it's up to 65,000. In addition to saving the cost of the outside service, PowerFax-I saved $8,500 a month by eliminating the costs of printing and mailing purchase orders, Larson says.

In September, Southern Pacific added LAN-based faxing. The quality team found that no single vendor could provide all the desired capabilities, so it worked with systems integrator TRS Technologies, of Portland, Ore., to put together a solution. PowerFax-II lets any user on the railroad's WAN send and receive faxes directly from his or her PC without involving any paper. Faxes can be sent of documents in any PC application, so they can be highly customized and include graphics. Automated fax-on-demand lets customers and others request standard documents via touch-tone phone.

A custom optical character recognition (OCR) form lets SP easily gather information from external sources, such as its 9,000 vendors. When the forms are faxed back, the data is automatically entered into a database.

The total cost for both projects was $230,000; net savings are $70,000 a month. In addition, the system "has made it so easy to deliver information," Larson says. "We'll probably be adding on to it in years to come."

–Katherine Auer

VITAL STATISTICS

Organization: *Southern Pacific Rail Corp., San Francisco*

Application: *Fax-based communications system*

Sponsor: *Jon H. Larson, business systems consultant (now with Integrated Systems Solutions Corp.)*

Technologies: *American International Facsimile Products' FaxMail; custom software from Micro Business Applications; Alcom Corp.'s LanFax Server; Nuntius Corp.'s FaxBack; Cardiff Software's TeleForm; IBM Corp. ES/9000, 386 and 486 PCs; fax cards from GammaLink and Brooktrout Technology Inc.; and integration by Centigram Communications Corp.*

Scope: *About 5,000 employees across the company; customers and suppliers*

Objective: *To improve customer service and efficiency and eliminate third-party service*

Payoff: *Net savings of $70,000 per month; improved customer service; new capabilities*

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Ernst & Young Presentations:
- "Assessing the Business Benefits of Your Information Technology Investments"
- "The Strategic Impact of Network Computing On Your Enterprise"

Tuesday, May 24

Gartner Group Presentations:
- "Enterprise Networking Five Year Scenario: Technologies, Products,Services and Management"
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